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OF THE

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EDITED BY

COLONEL SIR WILLIAM H. HORROCKS, K.C.M.G., C.B.

ASSISTED BY

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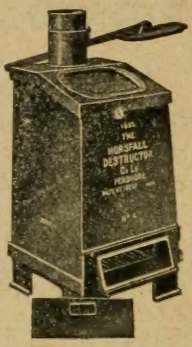

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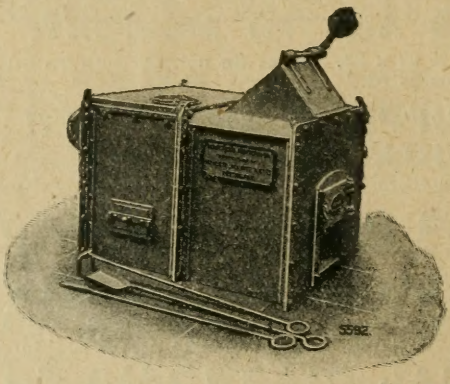

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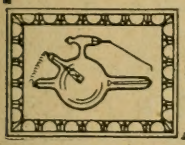

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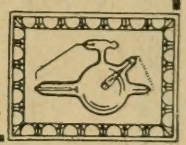

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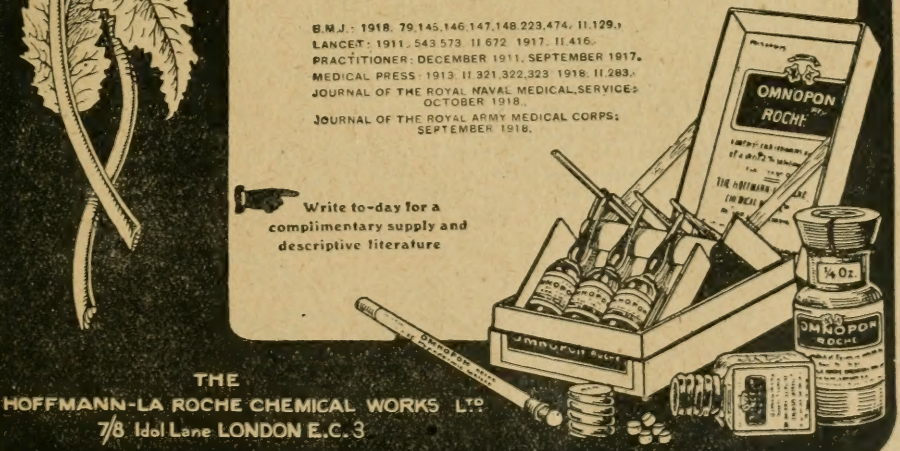

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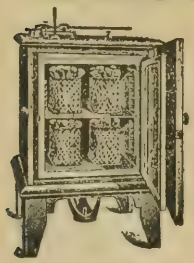

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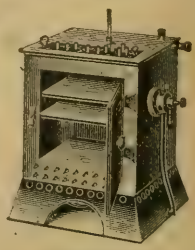

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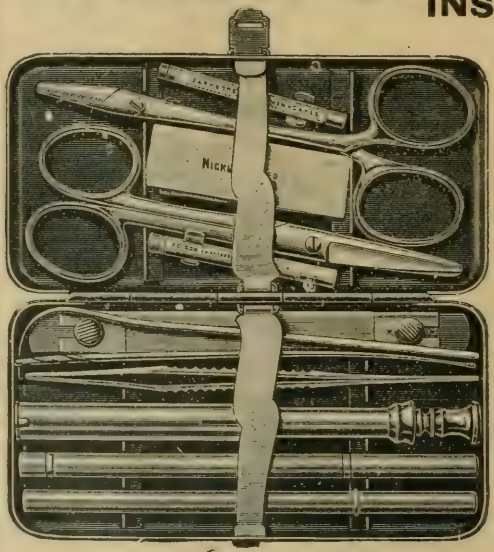

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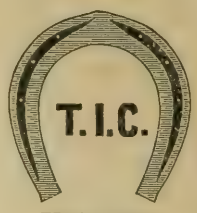

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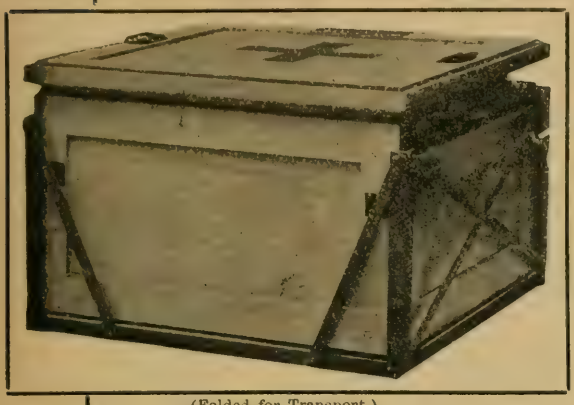

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Original Communications.

SOME MUSINGS OF AN IDLE MAN.

By Colonel R. H. FIRTH.

I WRITE these notes in the congenial surroundings of a wood in France,[1] where all around I see daffodils, primroses, anemones, violets and all the characteristics of spring. The air seems alive with the music of Nature's overture, preluding the great opera and spectacle of summer. All about is Nature's peace, and yet the intermittent shriek-like moan of a shell, the vicious barking of an adjacent battery and the more distant staccato notes of a machine gun bring home the thought and realization that not far away there is no peace but only evidence of man's insensate cruelty to man with all its associated misery and suffering, made yet so wonderful by man's own silent heroism. Of what that silent heroism is, my morning's round of advanced dressing stations and field ambulances has given me only too true a picture; but here in the late afternoon I want to forget and for awhile do forget, lulling myself into a false belief that things are as they ought to be.

It is difficult to suppress serious and sad thought, but as I look around me it is only too obvious that Nature is not at all interested in man's grief. She seems to be indifferent, but yet she is not callous, for, even here, I am conscious of a welcome indicative that, to those who seek her, Nature is willing to extend the hand of fellowship. The indifference of Nature to our woe is largely due to the fact that she is too busy, and the combination of the evidence of her toil and beauty holds attention and entrances. As I sit here I note poplars with catkins in full bloom all powdered with roan, alders tinted with a pale and duller red, and hazel bushes at a distance all dusted with a greenish yellow, while peeping out from some moss-covered

[1] Near Gorre. April, 1917.

stones three blooms of gentian glint as little stars, whose blue seems to be an expression of their eager but somewhat cramped life. But what appeals to me is the multiplicity of this eager life, suggesting a choir of clear voices singing together a song that no one had taught them.

With idle thoughtless whim, I pluck a bud from a tree branch within reach. A glance upward shows it to be from a chestnut tree. The bud-case within my hand reveals the leaves and flower buds of the horse-chestnut packed and folded with a precision beyond the ability of the most human handicraft. The more I look at it, the stronger appears the difference between any human craftsmanship and the natural growth of the bud. I do not merely feel that the fashioning of the leaves, the soft down in which they are compressed, and the sticky scales which enclose them are beyond the skill of the most deft human hand, but I know that no human hand can make a bud which expands day by day into the fuller bloom. Not only is it a matter of man's inability to make or originate such a living thing but also his inability for dealing with it. The tree above me indicates that Nature must have taken thirty years to raise it from nut to seedling and then on to its present maturity. True, the same stream of life is in man, but in dealing with human affairs we forget that the mature character which we desire can only be obtained by cultivating it fitly from the beginning. We cannot shape a living thing to our liking by any summary methods of craftsmanship such as we apply to a lock or boot. Unless the desired character is already in man and been developed by a long train of circumstances it is as hopeless to expect it to burst its wrappings at a liberating touch as it is to expect the production of the bud in my hand apart from the tree from which I plucked it. In both cases, the imitation would be a thing without life.

Again, as I sit face to face with the serene and secluded beauty of the place the question crops up, not so much why it should exist as why I or mankind exist. As contrasted with the perfections of the flowers, the grasses and the trees around me, the deficiencies of our own unsatisfied nature are emphasized. The superiority of human life over that of the flowers, trees and grasses lies assuredly in no achieved perfection but in the possession of a will to act and a moral consciousness which makes perfection inaccessible and disaster an ever-present contingency. By our mental process, I and other men are freed largely from an obedience to a settled order of times and seasons such as controls the natural world. It is this partial emancipation from natural law which distinguishes us from the other animals and makes us human. But this freedom from natural restrictions has its penalty and that penalty is our capacity for excess. The very sounds in my ears of not-far-distant war are an eloquent reminder of how men perish of their own excess. Because our life is better and fuller than that of the trees, flowers and grasses it can become unspeakably worse. The serene and soulless world is incapable of the degradation to which the possession of an intellect and will can lead man, if the dictates of morality

become obscured: and the very flowers, trees and grasses around me warn us to take care lest the qualities by which we excel in Nature become its greatest profanation. On this matter, I recall the words of Wordsworth and am tempted to say:

> "One impulse from the vernal wood
> Can teach us more of man,
> Of moral evil and of good,
> Than all the sages can."

II.

When on recent leave, I found time one day hanging somewhat heavily, so took a stroll along the more crowded thoroughfares of London. While doing so, it occurred to me to note the complexions of passers by. Excluding those of obviously foreign origin, I soon noted what a small proportion of fair complexioned people passed me. I use the term "fair" as meaning flaxen or yellow hair with grey, green or blue eyes. My wanderings took me through the western half of Oxford Street, Bond Street, Piccadilly, the Strand, Fleet Street, through the City and back by Moorgate Street, Newgate Street, Holborn and the eastern half of Oxford Street. The conclusion I reached was, that rather more than one-third of the persons I met in those thoroughfares had black or nearly black hair, one half had dark brown hair and about one-seventh light brown. The percentage of really fair-complexioned people I found to be comparatively small. The results as noted gave cause for thought, as we still assume that our natural complexion is fair. So impressed was I with the observed facts, that a few days later I devoted a week-end to making corresponding observations in portions of Yorkshire. While the totals observed in that rural area were less, a very definite increase in the proportion of people who could be classed "fair" was noted.

Now the question arises, what do the facts indicate? The answer lies in the appreciation of another fact, and that is that a like increase of dark complexioned people is observable everywhere. Central Europe, now occupied mostly by short-headed, dark-haired people, was once the home of a pure long-headed, tall and fair stock. I write without reference to exact literature, but I believe the last figures for the whole German army gave 30 per cent. blonde conscripts, while in Prussia proper the blondes were about 70 per cent. In Sweden and Norway, the fair type constitutes 76 per cent. But in each of these countries the proportion of "fair" is falling. The well-marked long-head is characteristic of the early Teuton stock to which our forefathers belonged. We still claim the lineage but with a diminishing right. Correlative with the long skull are tall stature, yellow or flaxen hair and grey or blue eyes. The Norwegians and Swedes come nearest to this type in these days. By a long-head is meant that type of skull which anthropologists call dolichocephalic: that is, its length

exceeds the breadth by a quarter or so. A short-headed individual means a person known as a brachycephalic, or in whom the length of skull exceeds the breadth by only a fifth or an eighth.

If history be any guide, we may infer that restless energy is the special attribute of the dolichocephalic races. Certainly, the record of the Scandinavian nations supports the view that they were adventurous. Above all, the long-headed or dolichocephalic is and has been a man of action and ideas, restless, fond of his home but easily tempted to leave it, greedy but thoughtless, better qualified to gain than to hold property, impatient of regular work, kind and good tempered, but subject to fits of ferocity. In truth, the long-headed or blonde race has been the disruptive element in European history, if not elsewhere. There is much to suggest that it came into the world late, possibly representing a late stage of evolution, and destined to break up or reform the established order of things when it grew powerful enough. On the other hand, the short-headed peoples are abhorrent of change. Laborious, economical, submissive, temperate, they are content with little and save upon it. Distrustful by nature, they do not move willingly. War has no charm for them, though they do not lack courage. Adventure would seem to repel them as a race-stock, preferring to till their fields, thrive and multiply.

Unless some unrecognized fallacy underlies these thoughts, complexion is a mark of race and a visible token of character. Nearly all the conquering and colonizing nations have been fair. The Assyrians seem to have been the one exception or, at least, we have no definite record that they were fair. The Athenians and Macedonians were certainly fair. There is no dark hero to be found in the "Iliad," and all the women and goddesses of Homer were fair. The early Romans were fair and tall, though dark and small in Julius Cæsar's day. Yet Cæsar himself was fair and Cato red-headed. Persians, Medes, Greeks, Gauls, Teutons, Slavs, Norsemen, Venetians, British and the Berbers, who conquered Spain, were all fair complexioned. In each and every case, as the times settled down a darker, short-headed race pushed to the front and the restless energy of the fair long-headed type ceased to be formidable. I have heard it said that we ourselves conquered India while we were fair but that we are doing our best to lose it as we darken. *Absit omen*, but one's musings lead to the thought that the gradual change in our national complexion denotes a reconquest of our islands; and that after the incursions of the Norsemen, Saxons, Danes and fair Normans, the ancient Briton is coming to his own again.

There is ever a danger in generalizations, but it is only too apparent that the conditions of modern life do not favour the roving adventurous spirit. Its day is past, and with its departure its physical type of man is going. Men so endowed obey their instinct unconsciously as evidenced by the deeds and initiative of our race in this war. But it comes to this, that the small, dark, short-headed race is better fitted for industrialism

which is the stamp and object of our civilization. It is for this reason that we find our old-time national type growing scarcer in the streets, less so in the country lanes or fields, but doubtless to become more scarce there later on. Certainly many factors are at work in bringing about this change of complexion. More than one observer has remarked how town life is obnoxious to persons of the fair complexion. When conditions are favourable, the blondes seem nearly to hold their own. It is a pity that we have not more exact statistical facts as to complexions, supported by reliable cranial measurements. Perhaps some day they will be forthcoming, and we shall then know how far the old fair dolichocephalic survives in our midst. If physiognomies can be trusted the type is rapidly disappearing, but what will that matter so long as the bold adventurous spirit remains? The theme is well worth developing on a basis of exact data and perhaps these musings of an idle man may stimulate some industrious man to collate the facts, if only to show that these ideas of the idler were based on a misconception.

III.

Have just finished reading two autobiographies, in neither of which does the writer make any attempt to gloss over or hide his mistakes or the follies of earlier days. The books have been amusing reading, but raise the thought, how much the world prefers pasts to presents, and how few people would care to read books concerning what So and So is and what he hopes to become. Such volumes would be merely books of good intentions and no one cares about good intentions, especially as a certain road is said to be paved with them. It has often occurred to me, what funny books they would be if we kept diaries, on one side of which we entered what we intended to do and upon the other what we actually did. Most of us in our youth have set out to remove mountains and, as we look back on our lives we realize only too clearly that the sum total of our efforts has been to kick over a molehill. Very few of us can go straight along the road which we feel our lives ought to follow; pity, love, hatred, health or the influence of others have so often turned us from our intentions. It would appear as if our good intentions go without reward and our bad intentions unpunished. It seems a mystery, and very suggestive of a scheme wherein the weak suffer for the strong, the good for the bad and those of good intentions for those who never had any at all.

But what of the past, be it our own or that of those who write autobiographies? The cynic will say that the wise will keep the past to themselves, unless an honest penny can be made by revealing it to a curious world. The well-advised will not be tempted to earn that so-called honest penny. The world consists of those who have been and those who have not been found out, and there is always an unexpressed sympathy in the hearts of the latter for the former and less fortunate. It suffices that we are what we are, and presumably fortified by the hope to be what we have

always desired to become ; so, let us take ourselves as we wish to be taken, and take others as we wish they would take us. It is a false philosophy to assume that the foolishness of yesterday or the evil we have thought or done can be any help either for the present or the future, so far as it affects others. As affecting ourselves, any merit associated with such past peccadilloes can only accrue by virtue of our present real sorrow and shame as to them. It goes too far to say that if a man never fall he can never rise; but it is true that the person whose temperament and character never lead him into temptation will never reach any great heights; he may not fall but he certainly will not rise, which means that he who has lived upon one dead-level can rarely have learnt a real lesson from life. In many cases, it is a lack of inclination or opportunity alone which separates the virtuous from the wicked.

Very few of us have gone through life without making mistakes, but having made mistakes we understand all the better the mistakes of others and so more readily forgive them. If a man fails of his best, the fault and the punishment are his alone. As I review my past years, I regret little that I have done. Certainly, I regret some things which I have done, but through regret, shame and sorrow we purge our hearts of much dross. Perhaps, in these events is born the soul's awakening.

> "But, whatever our faults, the purging
> Has cleansed us and purified ;
> With heart and with brain we must build again
> Things of proof that shall abide."
>
> * * * * * *
>
> "Each soul that strips it of one evil thing
> Lifts all the world towards God's good purposing."

IV.

Few of us who have served in France in the present war can have failed to be impressed by the high state to which agriculture has been raised in that country, and also to be impressed by the marvellous industry of the French peasantry. Often riding over the fields of the much maligned Low Countries, has it occurred to me how much agriculture is an art which appeals to the intellect as well as to the heart. A moment's reflection reminds one that the tilling of the fields has a traditional association with men's brains as well as with their hands, and those of us who can remember reading the Georgics must readily admit that, even from before the time of Virgil, agriculture has commanded the respect of the learned as well as of the unlettered. And why? Because the forces of Nature require all the wit of man to mould them to his own advantage, and on this simple fact the connexion between brains and mother earth is indisputable.

This thought acquires an additional interest now, for our daily paper is

full of allotment culture and other schemes to reinforce homegrown food. One wonders whether the awakening interest of the people at home in the oldest of the arts will serve to deepen and emphasize the happy union of brains and land, and that the educated classes may yet find in agriculture an Alma Mater which now they but little realize. There is nothing revolutionary in the thought, for the history of agriculture is full of instances of the keenness and delight which some intellectuals have found in husbandry, not merely as a refuge from the cares of town, but health, peace and means of livelihood.

The sceptic may quote the old rhyme, "He who by the plough would thrive, himself must hold the plough or drive," and argue that it is not a calling for amateurs. But is the objection valid? One is tempted to say, no, and that, like converts to a new religion, enthusiastic amateurs have more zeal and more application; in short, have fewer prejudices to surmount and more enthusiasm for the calling than those who have been brought up to it from infancy. Zeal and application are more than a set off against a want of detailed knowledge, and the value of the study of the principles which underlie farming or agriculture was recognized by educated men long before the days of agricultural colleges. Probably there exists no art of any magnitude, save agriculture, in which so much empirical and localized opinion, haphazard conclusion and superstitious reverence for tradition or precedent gains currency and secures a following. Freedom from prejudice is not the least asset which education brings and to be free from it all in farming is to start fair.

The State now recognizes the husbandman so lavishly that the game is worth trying. True, agriculture is the most variable and fortuitous of the arts, but she is a kindly mother to the children who trust her, and many of the war-shattered may find peace in her bosom. One cannot but wonder if and hope that the lesson may be taken to heart.

V.

The casual remark by a friend that "So-and-So must be a rich man," prompted the questioning thought "Why?" To say that a man is rich implies of course the fact that he is effectively wealthy. It so happens that the person of whom we were talking is a man credited with considerable financial resources, but one who does not spend much money and, owing to this failure on his part to exchange his wealth for something else, is regarded as being doubtfully rich by some of his acquaintances. The question arises, who is a rich man? A variety of definitions suggest themselves. Thus, a frivolous friend says a rich man is one who cannot enter the kingdom of heaven, or another may say he is a man who has to pay supertax. Perhaps a better and more obvious answer is, "He that has the means to get what he wants without thought or worry." If this be correct, presuming that So-and-So gets all he wants, then he may be

accounted to be a rich man in spite of his not spending all or the greater part of his income. Putting myself in the position of a man who has great financial resources, I am confronted with the possible difficulty that I may not know what I want. That is precisely the trouble which must and doubtless does worry many who are deemed rich and who have wealth. Again there are men, well endowed with money, who seek and desire power or patronage. It is questionable whether they can attain or exercise it by money alone; the essential of personality may be lacking and if so then such men may buy power but someone else will use it. This brings us up against the basic fact that, in spite of great financial resources, a man is more often than not baulked in the employment of them simply because he cannot want genuinely as much as he has the means to buy. Or, if he does genuinely desire or want so much, his conscience will not allow him to keep it. If we think a moment, we realize that the things which the majority of sane people want are not, in the Crœsus-sense, dear. I have an uxorious relative who would at once say that children are the only things sane people want, and certainly they are not dear in the millionaire sense. Hence, the man with great financial resources cannot necessarily make the full use of those resources and the mere possession of money does not make a man really a rich man.

I remember well being told as a boy that the only way to get rich was to earn a shilling and to spend but elevenpence. To me that was a policy of perfection and, in the light of present reflections, I can see that had I displayed such thrifty habits there might have come a day when if I earned more than a certain number of shillings I should not be able effectively perhaps to spend elevenpence out of each of those shillings. It was very good advice but presented a serious check on ambitions and no negligible premium upon making me a man of small ideas and restricted outlook. Doubtless there are many who have gone through their best years actuated by such a policy. But, what has been their gain? Something saved against a rainy day perhaps, but, since they neither think rich nor act rich, we cannot call them rich. Not only that, they have not the merit of being overtly poor. The best that can be said of them is, they are or have been cautious, self-denying and probably covertly envious. Therefore, these are not they who are rich and we must look for the rich man elsewhere.

The question is, where are we to find him? Perhaps near at home. It certainly is not a fellow messmate whom I know to have a good wife, a moderate fortune, a good conscience, but unfortunately a bad digestion and a pessimistic outlook on life which makes him see so much vanity and weakness in all his fellow-creatures that he believes neither in them nor in himself. I often look at him across the table and say to myself, "poor beggar," and that about sums it up; he is not rich but really poor. I contrast him often with myself, by kindly Providence endowed with what he has lacked, a good digestion and a confident belief in myself and in the world. Dare I say, "Eureka"? for, if so, then surely it is a princely find

and the very basis of riches. To a great extent, yes, but not wholly so, because a mere mental outlook on the world will not in itself constitute riches. Many a man owns a good picture, but, unless he appreciate it, he does not possess it. So, as in regard to other and greater things, riches may give ownership, but without knowledge, experience and sympathy there is no real possession. The fact is no one can possess the whole world, but all can possess some one phase or aspect of it, and it is to those who have money and the leisure to use it that is given the ability to possess the world sympathetically and comprehendingly at many parts or in many phases. The danger is lest we forget that money can be used for good and useful purposes, and that too often the man who is greedy for money does not want to use it for such purposes. His greed has become abstract and is a greed for a mere symbol and forgetful of what the symbol implies. The conclusion, therefore, is that the mere possession of money, without a corresponding ability to appreciate and enjoy what that money can buy, does not make a man truly rich, and it follows from this that the man who devotes all his time to getting money has often no time left for getting rich.

VI.

With somewhat mixed feelings, I have just thrown down the daily paper. Its dominant theme was that industry, finance and the public services demand the leadership of the young. To me, as a man nearer 60 than 50, such a view suggests certain reflections. Doubtless, the cannibalistic propensities of modern industrial life have given rise in some quarters to the belief that the world's progress is dependent upon the number of funerals conducted for those who sit in high places. The explanation is that modern industry wears out brains in the office as speedily as it does hands in the workshops. The exigencies of the process hurry much good metal to the slag dump and our competition methods demand young men for the reckless driving. The same arguments or reasons operate in the public services, notably in the Army and the Navy, especially under conditions of modern war.

Inquiry into the question of "meridian" in the sphere of war gives 31 as the average age of such great commanders as Xenophon, Hannibal, Scipio, Pompey, Cæsar, Drake, Turenne, Blake, Eugene, Rodney, Columbus, Nelson, Napoleon and Wellington. But these are types of men seldom available after long years of peace, during which the profession of arms fails to attract ambitious young men with habits of industry. Hence, when a great war comes "out of the blue," we find the higher ranks filled by men representative of a leisured class, few of whom are fit to take up exhausting strenuous work. It follows that the first phases of such a war must be carried on by them, but gradually they cannot stand the pace, and are more profitably replaced by brilliant men of half their age. On the other hand, in literature and art some of the finest work has

been done by the old as by the young men. Take William de Morgan. Throughout a busy life other interests engaged his powers, but at 65 he began to turn out a marvellous series of books, starting with "Joseph Vance" and ending with "Ghost meets Ghost," written when he was well in the seventies. Similarly, Sidney Cooper reached the mature age of 99, and yet in our galleries are to be seen his wonderful paintings of sheep, done when he was 83. Likewise, the celebrated altar-piece picture, "SS. Jerome, Christopher, and Augustine" in a beautiful mountain landscape by Giovanni Bellini, and destroyed by the Austrians with the church of San Crisostomo in an air raid over Venice, was painted by the artist in 1513 when he was in his eighty-fifth year. But we need to be cautious how far we carry our generalizations. One is tempted to admit that industry seems to demand the lash, but the forces of social progress require light and gentle hands upon the reins. As we pass from our national immersion in the floods of industrialism or war activities to a wider vision of administrative or of social aims and ideals, we recognize that knowledge, character and experience have priority over raw strength and the purely acquisitive powers.

I am reminded here of a passage I read not long ago in Morley's Life of Gladstone. In the midst of the late Irish crisis, some one asked the old statesman whether he did not find it hard to give up the years which should be devoted to rest and leisure to such ardent service of his country. The reply was, "My vision is clearer and more inspiring than ever before. The burning enthusiasms of youth cannot be compared with the calm assurance which I now feel that the right must eventually triumph. It would be quite impossible for me to deny myself the ineffable joy of a part of the conflict." To me, that is a very remarkable and suggestive sentiment and but illustrative of the view that old age should bring to every one something more than mere leisure or peace of mind. It must be productive of actual results or peace will not be possible to a vital personality. The words of Browning seem apt:

> "Grow old along with me
> The best is yet to be,
> The last of life, for which the first was made;
> Our times are in His hand
> Who saith, "A whole I planned,
> Youth shows but half." "Trust God, see all nor be afraid."

Again, while the experienced among us can inspire, they cannot find new ways, yet who will deny to each ancient that the future always looms above the past? The heart-beats of the old and experienced are very present facts and factors in the world's evolution toward better things. Therein is the fundamental secret of a life worth living after one has been in the world for over fifty years; everything done in the past multiplies the effectiveness of each renewed effort. I have no doubt but that between

20 and 40 a man accumulates more goods and knowledge than he will acquire between 50 and 70, but when it comes to wielding a positive influence in the largest things, the later period is easily pre-eminent. In the heyday of youth we cannot help but waste a great deal of time experimenting. We try ten ways before we hit on the right road, and the world doubts us more than we doubt ourselves. Another factor making for the effectiveness of the older men is the great load of luggage which time has caused them to discard. The world of thirty is naturally the home and added to it that restricted sphere of effort which the support of home involves. It is the time for economic things, not philosophic and social problems. A man at 30 can rarely be really sure of anything beyond the fact that he is alive and at work. I am inclined to think that the experience of the thirties is not even comprehended in the fullest sense until after 50.

At forty one fights with men of forty, but at sixty one walks again with the lad of fifteen. This is no trait of senility but only the wisdom of sixty asserting its knowledge that the most satisfying of present experiences is companionship unharried, and free from the need to grind at the expense of the eternal verities. While age can fight as hard as youth, it can also enjoy more keenly the victories long deferred. It can appreciate the chances of a cause and feel even more deeply than those whose social philosophies must necessarily be untried of experiences. Therefore, though the times demand more of our young men, it is difficult to admit that the sphere of utility of the old men is removed. There is room for both, for the social consciousness expresses itself more completely through minds mellowed and tempered by long service, and the social hope anchors its grappling irons most seriously in hearts and minds tried by long service to ideals. Youth may be absorbed by and be better suited to the striving, but the heart of age appraises better the value of the results. The drama of life is too complex and its staging is too vast for the principal parts of its comedies and tragedies to be played by only one group of actors. Let us never forget that even though history is made by men, yet men are the products of history and experience.

VII.

Circumstances permit me to enjoy a short stay in Wiltshire and, in leisure hours, the primitive man within me asserts himself by impelling me to wander over the chalk hills and downs so characteristic of the district. With comforting pipe and lying in some sheltered spot, one can then forget all the arts and panoplies of man's war and contemplate the various phases of Nature's war as well as those of her peace. In truth, it all has a charm of its own. What fascinates me most is the wonderful great sea of green billowy hills, extending bare against the wide sky to the horizon, clothed with an elastic turf and, here and there, topped by a clump or grove of trees which is a sure and certain sign of more primitive times when the groves were God's first temples. It is no far-fetched simile, for I see before me now

a clump of trees most temple-like in form emphasized by a huge prehistoric earthwork, ring within ring, enclosing the grove on the space within.

As I pen these notes in the shade of such an hallowed grove on a hot and windless summer day, I see the air near the surface of a distant down appearing as a silvery mist wavering, dancing and producing an illusion of motion in all distant objects. Then, as I withdraw my eyes from the distance and look closer around me, the grove becomes as a small island of animal life dumped down on the ocean-like smooth green waste, all vacant as the sea. It is the sight of the wild life all about which refreshes more than the leafy shade, for without this life the grove would indeed be a melancholy place. The ear catches the crooning sound of doves and in the higher trees some wood-pigeons have their nests. On a thorn bush near by sits a magpie. A little farther off, a quaint family of owls sit side by side on a dead branch in the hollow of a furze-bush. As I watch them, the sun shows up their colouring and their long black narrow ears stand erect in astonishment, while five pairs of round orange-yellow eyes stare back at me. In a clearing, strut and chatter a small cluster of starlings, finches and linnets busy in search of food. Suddenly, the whole air of calm is gone, for across the clearing swoops a sparrow-hawk. Possibly, there is no more fascinating spectacle in wild life than the chase of its quarry by a hawk. Such sights are not common in these days, as the gamekeeper has extirpated ruthlessly all the more interesting specimens of bird life, especially the predatory birds, from our woods. What can be more depressing than a keeper's gibbet? where hang stoats, weasels, moles, crows and rooks, to say nothing of jays, magpies, kestrels and sparrow-hawks. Such a keeper's gibbet is decorated after the manner of a modern woman with wings and carcases of birds and heads and tails of little beasts, making the wood in which it stands a travesty of what it was meant to be, that is, at once Nature's playground, her school and example to man. Curse and degradation are written only too clearly on such places, and the pity of it all is that the writing is by the hand of man, Nature's greatest child.

It is sad to reflect that the groves and woods which form bird refuges or small sanctuaries for wild life are getting rarer every day. A few years of kindly toleration or love of birds on the owner's or tenant's part would serve to people a grove or wood with great Nature's happy commoners; but the newer fashion of sport has made those who had been and should now be the preservers of our country's wild life, its systematic destroyers. Our noblest species of birds are going or gone, such as the raven and buzzard, the goshawk, kite, peregrine, kestrel and sparrow-hawk; and in their place remain only the finches, sparrows and semi-domestic poultry such as pheasants and partridges. The gradual extinction of the soaring birds is all the more regrettable as they were and should be still a feature in our landscape, making it seem vaster, the clouds higher and the sky so much farther away. Indeed, they were something more; for the sight of them and the sound of their shrill cries completed and intensified the whole effect of Nature's wildness and majesty.

Alas! all seems changed now and it is rare to be able to find a wood, grove or copse truly peopled by normal bird life. To the natural man, the woods and their feathered inhabitants have another call. Like the ocean and the desert they revive a sense of which we are too often unconscious, but which is always with us; it is the sense which comes down to us from the time when the principal activities of our race were in woods and deserts. Given the right conditions it springs to renewed life and to me and many it is that which gives life's best savour, and not one to be replaced by the objects which civilized dwellers in towns have invented as substitutes. On the downs and in the groves we are able to forget the artificialities. In such moods and in these green shades, we are ready to echo every grateful word spoken of those who have preserved for us so much of Nature's freshness. Doubtless they did it for their own pleasure, but incidentally the good was for all. *Requiescat in pace.*

VIII.

At times, I have been twitted by my friends as being somewhat of a "solitary bird." Whether to take it as a reproof or not I do not know, but I do know this, that there come moments into the lives of all of us when we long to get away from everything and everybody, that is away from everyday life or the irritations of the trivial. When I was a boy, I knew an old man who was a shepherd. He was an oddity in his way but almost a chum of mine. He used to interest me not so much by what he told me as because of his taciturnity; he seemed ever to be watching, observing and thinking. I remember asking him once whether he was not dull. This he would not admit, and now, as I recall his grim rugged face and slow drawn speech, I realize that though he would tell me little about the truth of many things, yet he felt it. The clamouring of the crowd did not reach him, but thoughts came to him which were real individual thoughts, often quaintly expressed and in those days wasted on my unappreciative ear. Now, my view is that I am all the better for living the life of a shepherd occasionally, or even for a short time each day.

In claiming this privilege, I am actuated by no desire to be unsociable but rather to assert the principle that if you cannot get away from your surroundings from time to time, you can never get outside them, and so develop a sense of criticism. The desire for solitude is no modern symptom, for in ancient times there are said to have been as many anchorites in the deserts of Egypt as there were men in her cities, and in the Middle Ages we know that monachism was a fashionable cult. However, the craving for thoughts that bring light need not drive us into the waste places of the earth or to the hermit's cell. As against these devices for clearing up things in our minds, it may be affirmed that our capacity for thought is independent of environment, or that the only real necessity is a sufficient intensity of desire within ourselves. Given this

desire, the prosaic difficulty arises for the greater number of us that the moment we try to get away from our conventional duties or responsibilities and show signs of restiveness our friends and relations begin to comment. Even so, we cannot get away from the fact that we all need to retreat occasionally, to seek some quiet sanctuary far from the turmoil of life and the agitating society of our fellows. Some quiet place where all the world is sexless is necessary to every man if he does not wish to decay of too much animation. It has often struck me that the majority of people live far too much in view. Emerson, I think, has said that no man or woman is really his or her true self except when they are alone; and this is true because most things in this world have become a pretence and the moment we find ourselves in the company of others, we instinctively assume a mask. True, the mask which we put on may be sometimes more beautiful than the mood which lies behind it or conversely it may be more unkindly, yet still a mask is always a mask, and frequently none too comfortable to wear. Hence arises our longing to get away by ourselves. Apart from this, to be ever with others involves a constant emission of ideas which results ultimately in a sense of staleness or void. If we are ever talking we can never be thinking, and if we never think our heads become empty. The chance to fill that emptiness or need to restock our minds comes best and often only when we get alone by ourselves and are able to think things out. This explains why people who are always with other people, and are never happy unless they are with others, are so frequently dull. These are the people who never realize that a too great propinquity, though it may breed love, will as surely kill it. Small talk may make an interesting letter but it is fatal to real reposeful friendship, and it is the small talk of our friends that lines the nest wherein so many "solitary birds" are hatched.

IX.

A small boy friend of mine celebrated recently his birthday. Among the gifts which that day brought him was a set of drawing instruments, and it happened that I devoted an hour to his amusement by helping him to draw geometric figures, for which he appeared to have a great liking. Circles and figures which included arcs or curves seemed especially fascinating to him. Whilst drawing these rings or circles for the child, certain thoughts presented themselves; true, they were thoughts which I could not develop to so young a lad, still they reasserted themselves in later hours of idleness and their theme takes the following form. Just as around every circle another can be drawn, so in nature and to our human efforts there is no end, for every end is a beginning and every action admits of being outdone. This fact, at once the inspiration and condemnation of every success, is the symbol of the unattainable, and finds its illustration in many phases of human life.

It has been well said that the key to every man is his thought, which

means that all his actions are orientated to or dominated by his soul or personal idea, and that he can only be changed by showing him an idea which commands his own. The personal idea is but the centre of a ring, and the whole life of man is a self-evolving circle expanding outwards to new and larger circles *ad infinitum*, and the extent to which this making of circle outside circle depends on the force of the individual soul. If we reflect a moment, we see that each apparent ultimate fact is but the first of a new series and that there is no circumference to us. A man makes his mark in his day but another arises and draws a circle outside the ring which but a short time before was regarded as the spherical limit. In this manner, the hero of to-day may be and often is the hot potato of to-morrow, and that the results and principles established or discovered and regarded in our time as the last word become in the next generation abridged into a phrase or merely quoted as one example of a bolder concept. From this it becomes apparent that we men but stage the world as prophecies of the next age, and that each one of us is not a workman in the world, but rather a suggestion of what he should be. It is like some mysterious ladder of which the steps are actions or results, each being judged by that which follows. We all know how we dislike new statements or ideas, but we soon get accustomed to them and gradually the objections dwindle before the revelations of the new hour. Even in our purely personal affairs it is the same; each of us supposes himself not to be fully understood and that he has a greater possibility, hence man's continual effort to raise himself. Yesterday my mind was a void, yet to-day I may be full of thoughts and in a mood of self-conceit put them on paper, but in a week or a month's time I may wonder how I came to write or think such banalities. It is all comparable to a vast ebb and flow, periodically heaping itself on a containing wall, there to solidify and hem itself in, then bursting over that boundary and expanding another stage only to create a fresh high wave which attempts again to stop and enclose.

I am reminded here of the old saying, "Tell me who are a man's friends and I will tell you what he is." This is but another way of formulating the axiom that a man's growth is seen in the successive circles of his friends, and that friends cease to interest us when we find their limitations. Think of the friends and loves of the past. Alluring and attractive they doubtless were, metaphorically a lake in which to swim, but gradually we found their limits and what seemed a lake became a puddle and we cherish no regrets that we got out of it and see those friends no more. The metaphor holds good in respect of the higher things because each new step in thought reconciles many apparently discordant facts as expressions of one law. Even our virtues are not final, for the virtues of society are vices of the saint, and our faults or sins may be the living stones out of which we shall construct the temple of God. All our hopes, thoughts, religion and morals are at the mercy of some new generalization because our instinct presses ever onward to the impersonal

and illimitable, and extinguishes each virtue in the light of a better. Similarly, if we look at the natural world we can conceive it as a system of concentric rings and presenting a condition which is never stable but ever moving onward. And yet this incessant movement and progressive generation of ever widening circles involves the recognition of some principle of stability at the centre and within us. What that is, it is hard to say, but it evidently is something which contains and impels all its enlarging rings or circles, and by virtue of that is superior to knowledge and thought. Its labour seems in vain, for that which is made suggests ever how to make a better. So it goes on, and there remains only for us to forget ourselves and to do something without knowing how or why ; in fact, to draw a new circle outside that in which we happen to be. Never ending, still beginning.

EXPERIMENTS CONCERNING THE EFFICIENCY OF HOT-AIR HUTS FOR THE DISINFESTATION OF BLANKETS AND CLOTHING.

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With Plans of an Improved Pattern of Hot-air Hut and Chart showing graphically the Experimental Results.

I. Introductory Notes.
II. Description of Hut.
III. Capacity of Hut.
IV. Periods required to Load and Unload.
V. Details of Fuel Consumption and Periods necessary for the Attainment of Lethal Temperatures.
VI. Experimental Methods.
VII. Tabulated Experiments.
VIII. Conclusions based on the Results attained.
IX. Recommendations and suggested Improvements for Hot-air Huts of this Type.

Introductory Note.

The research with which this paper deals was the outcome of instructions received by Captain Grant from the Deputy Director of Medical Services of the Eastern Command to carry out a series of experimental tests in the Hot-air Hut established at Moore Barracks Hospital, Shorncliffe, Kent, with a view to settling the following questions :—

(*a*) The temperature necessary for the destruction of lice and nits under practical conditions of a fully loaded hut.

(*b*) The effect of the temperature necessary for this purpose on bacteria.

(*c*) The most suitable temperature to maintain with a view to: (1) Maximum lethal results; (2) avoidance of damage to the articles treated; (3) and economy of fuel.

(*d*) The possibility of improvements in the construction and methods of working.

During a consultation with Mr. Bacot, at the Lister Institute, concerning ways and means, the experiments necessary for the solving of these questions were discussed and the main lines of the procedure were arranged; Mr. Bacot undertaking to supply and dispatch from London the batches of lice and nits as required in readiness for exposure in the hot-air hut at Shorncliffe, and further to carry out the necessary examinations after exposure, and to incubate the nits, the control and manipulation of the hut and bacterial work devolving entirely upon Captain Grant.

In considering the results of these experiments it must be borne in mind that the conditions imposed on us by the use of an existing hut of admittedly imperfect character prevent the exactness and definiteness which are possible under laboratory conditions, where the apparatus is, owing to the gradual improvement on the part of generations of workers, capable of extreme exactitude. On the other hand it is to be noted that these experiments were carried out under the practical conditions of a fully loaded hut, and at the same time they were based on the exact observation (we think for the first time) of a very large amount of material. The number of active lice used for experiments and control was at least 700, while the nits used numbered anything between 3,000 and 8,000.

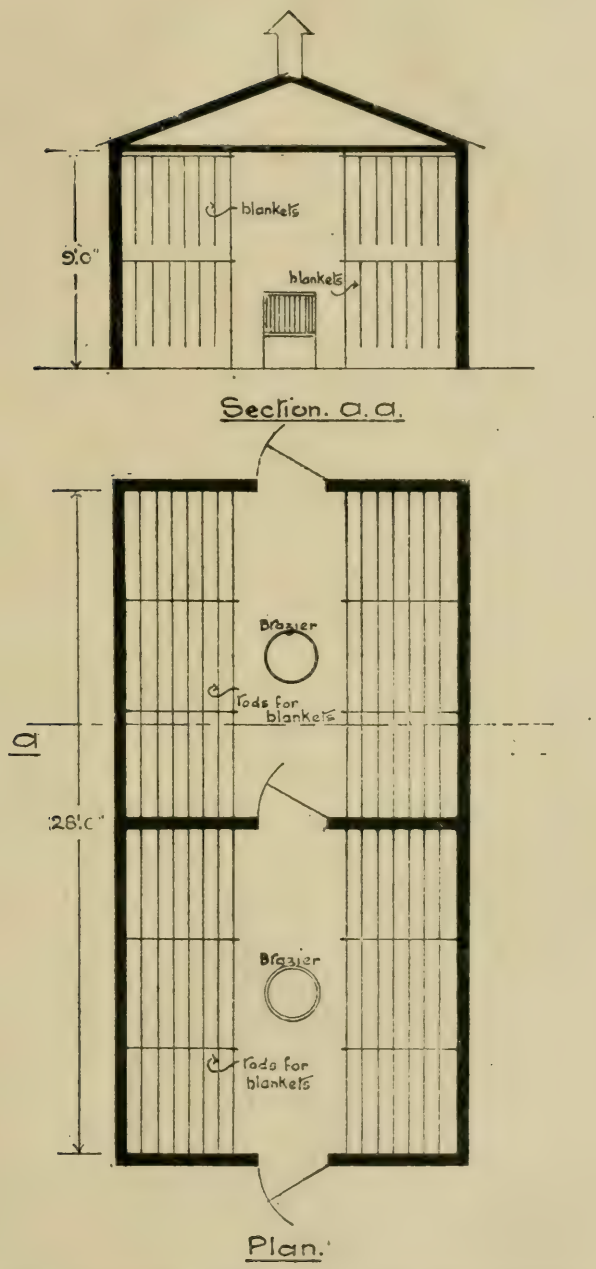
Description of Hut. (Plan 1.)

The hut at Moore Barracks Hospital, Shorncliffe, designed by the officer commanding Canadian Sanitary Section, stationed there, had been constructed for the purpose of disinfesting blankets and kits by means of hot air generated by an open coke brazier in each half of the hut. The dimensions of the complete hut are: Length, 28 feet; width, 14 feet; height of flat ceiling inside, 9 feet.

The sides and roof are made of galvanized iron, the floor of concrete; the walls and ceiling are lined with uralite. It stands in a very exposed position, and the weather during the first six experiments was wintry.

The hut is divided into two equal halves by a cross partition of wood, covered on each side with uralite. In the centre of the partition is a door; the dimensions of each half-hut are, therefore, 14 feet long, 14 feet wide, 9 feet high; cubic feet, 1,764. In the centre of the floor of each half-hut is the open mouth of a four-inch pipe, the other end of which is in the open air at the side of the hut, a few inches above the ground. The size of this external opening may be regulated by a damper. In the centre of the flat ceiling of each half-hut is a trap door which is opened or closed by means of a rope and pulley worked from outside, close to the door. On top of the sloping roof is a louvred ventilator. There were two braziers with legs eighteen inches long, one for each half-hut; these can of course be used simultaneously in each half-hut, but the chief object of the double arrangement is to permit unloading and loading in one half during the period of disinfestation in the other half.

Let into the door was a glass panel through which the temperature, as recorded by a thermometer whose bulb was three feet from the floor, could be read. So far as we are aware, the correctness of the readings of this thermometer as recording the temperature available for the destruction of lice and nits in blankets and uniforms under Army conditions, in all parts of the hut, had never been called in question. Our suspicions of the accuracy of this method of arriving at the internal heat of the chamber were aroused, from description, before we had actually seen the hut. We



PLAN 1.—Hot-air hut at Moore Barracks Hospital, as originally designed. (Drawn by Sergt. F. G. Grierson, R.A.M. College.)

therefore made use of several maximum thermometers with the result that our suspicions were fully justified, as will be seen from a study of the earlier experiments. After alterations initiated by Captain Grant in regard to the lowering of the brazier to within two inches of the cold-air inlet, the lowering of the level of the latter, and the placing of a second thermometer, four inches above the floor, it was possible to use the hut with some assurance with regard to results. Apparently no critical tests previous to ours had been made, or these defects would hardly have escaped notice.

Capacity of Hut.

The capacity of a hot-air hut depends not alone on its cubic capacity, but also upon the arrangement of the tiers of bars or rods upon which the clothes or blankets are hung. The load depends on the number and length of rods. Each rod, measuring 4 feet 8 inches, takes 5 blankets; the number of rods in a half-hut is 60, and so the number of blankets in a half-hut of above dimensions is 300. The blankets are arranged on one-inch iron rods in two tiers. Each blanket, being folded lengthwise, is thrown single-thickness over the rod and pushed along from one end, so that it becomes more or less puckered. By means of slideable hooks or coat-hangers, about 100 kits, including greatcoats, can be disinfested at one time; tunics and trousers are turned inside out.

Periods Required to Load, Unload and Ventilate.

The time required by two men to load each chamber of the hut to its full capacity (i.e., 300 blankets) is twenty to thirty minutes. Unloading can be accomplished by two men in twenty minutes. The time required to ventilate and get rid of the dangerous carbon monoxide, after removal of the brazier, is five minutes, but this time may be reduced if all the doors in a hut be opened at once.

Amount of Fuel needed and Period required to attain the Lethal Temperature.

The amount of coke required in the brazier for the first batch of infested material is 40 pounds, for the second batch 20 pounds are added to the coke remaining in the brazier, for the third batch 20 pounds are added to the coke remaining in the brazier, and so on.

The time required to attain a door temperature of 65° C., with the thermometer bulb four inches from the floor, after placing the glowing brazier in the cold hut for the first load of the day, is sixty minutes at least; but for the second and subsequent loads about thirty minutes suffice.

Experimental Methods.

Lice and Nits.

As noted in the introduction, the batches of lice and nits used in the experiments were forwarded from the Lister Institute and returned thence after exposure. The time elapsing between dispatch and exposure was

seventeen to eighteen hours; the period between exposure and examination being as a rule about twenty to twenty-two hours. The active lice were fed immediately prior to dispatch, and, judging by the state of the alimentary canal of the controls on return, this meal was amply sufficient for forty-five to fifty hours under the temperature conditions during the two journeys. In Experiments I to VII, five boxes containing active lice, as well as nits, and five pockets containing nits were used; in Experiments VIII to X, pockets of nits only were exposed. The boxes used were ¾-inch in diameter, of the usual entomological pattern, with glass bottom and card sides. A ring of Army shirt flannel was placed in each box to give the insects foothold, the nits being laid on a similar slip, while the open top was covered with fine gauze. Each box contained at least 20 active lice and from 50 to 100 nits. The pockets measured 2½ inches by 1½ inches, and were made by folding a slip of khaki cloth and stitching the sides, a strip of flannel on which 50 to 100 nits had been laid being placed in each pocket; the aim being to reproduce the conditions of nits laid in the seams of clothing. In every case four only of the boxes or pockets were exposed, the fifth being utilized as a control. On exposure the lid of the box was removed, so that the top was open, save for the gauze cover. The khaki pockets were pinned on either blankets or clothing, and the boxes stood upon the glass bottom with the gauze covered top above. On their return the contents of each box or pocket was carefully examined under a binocular dissecting microscope and those nits which were not obviously destroyed were kept in separate boxes and incubated with the controls in a bag suspended from the neck, between skin and shirt.

Bacteria (Experiments I to V only).

The cultures of *Bacillus typhosus, Staphylococcus aureus* and *B. coli* were obtained from the Royal Army Medical College. About half to one hour before exposure, a loopful of a twenty-four hour culture grown at 37° C. was spread on a piece of sterile khaki ½-inch square enclosed in a sterile petri dish. After exposure, the piece of khaki was transferred to a tube of bouillon and incubated at 37° C. for forty-eight hours. As a rule the lids were on the Petri dishes; sometimes duplicate open dishes were used as well, but with the same results as in the closed Petris.

In every case the hut was fully loaded with blankets and clothing when the experiments were conducted.

Temperatures.

The temperatures necessary for the destruction of lice and nits in laboratory tests are recorded by Bacot (1916) to be 54° C.; Haymann (1915) 65° C.; Kinloch (1915) 65° C.; Nuttall (1917) 60° C.; it was therefore decided to commence by verifying these temperatures under practical conditions. A maximum thermometer was placed with each of the four lots of lice, nits and bacteria exposed in the position noted in the protocols.

The accuracy of these thermometers was carefully tested before use. All four were placed in an incubator running at 37·6° C., and all recorded that temperature. They were then, with two of the routine laboratory thermometers, placed in beakers of water of various temperatures, and again found to be in unison.

The half-hut, having been loaded and the trial pockets of lice, nits, bacteria and maximum thermometer having been placed in position, the glowing brazier, which had been kindled about an hour beforehand, was carried in and placed over the cold air inlet and a sheet of iron placed over it to lessen the danger of fire, and throw the heat downwards. The door was then closed and a watch set on the door thermometer, the period of exposure being counted from the moment when the predetermined temperature was reached.

The Experimental Evidence.

The first three experiments, as regards the boxes and pockets containing the lice and nits, were simple exposures, but the bacteria received more or less protection from the heat by placing the treated slips of khaki in folds of blanket or in the pockets of tunics. In later experiments both the lice and nits were sometimes similarly protected; in one instance (Experiment IV) by as many as four folds of blanket, and in another instance (Experiment VI) by the fabric of wet garments.

EXPERIMENT I.—Tuesday, April 3, 1917. Temperature, as Recorded by Door Thermometer, 140° F. (60° C.) for Fifteen Minutes.

No. of test	Position	Maximum temperature in C.	Results on				
			Lice	Nits	*B. typhosus*	*S. aureus*	*B. coli*
1	Middle of floor of west side of hut on a board ¼ in. thick, 5 ft. 4 in. from brazier	37°	Not killed	Not killed	Not killed	Not killed	Not killed
2	Lice on board laid on second tier, 5 ft. from floor, south-west corner 1 ft. from wall. Infested khaki pinned within blankets at same place	67°	Killed	Killed	Killed	Not killed	Not killed
3	Lice on board on first tier 2 ft. 6 in. from floor, north-east corner 1 ft. from wall. Infested khaki in blanket	53°	Killed	Not killed	Not killed	Not killed	Not killed
4	Lice on board on third tier 6 ft. 10 in. from floor, south-east corner, 1 ft. from wall. Infested khaki in tunic pocket	103°	Killed	Killed	Not killed	Not killed	Plate broken
5	Control lice and nits kept at room temperature. Lice active on examination; nits hatched normally after incubation.						

Remarks.—The general working thermometer was placed 2 or 3 inches. behind the back of the door, to which it was fixed by a wooden case, the bulb being 2 feet 3 inches from floor, and the index readable through a glass window.

EXPERIMENT II.—FRIDAY, APRIL 6, 1917. TEMPERATURE, DOOR THERMOMETER, 52° C FOR THIRTY MINUTES.

No. of test	Position	Maximum temperature in C.	Results on				
			Lice	Nits	*B. typhosus*	*S. aureus*	*B. coli*
6	17 ft. from floor in middle of west side	55°	Killed	Killed	Not killed	Not killed	Not killed
7	Same as Test 2	90°	Killed	Killed	Not killed	Not killed	Not killed
8	Same as Test 3	68°	Killed	Killed	Not killed	Not killed	Not killed
9	Same as Test 4	106°	Killed	Killed	Not killed	Not killed	Killed
10	Control lice and nits kept at room temperature. Lice, two dead out of fifteen; nits hatched normally.						

EXPERIMENT III.—THURSDAY, APRIL 12, 1917. TEMPERATURE, DOOR THERMOMETER, 60° FOR ONE HOUR.

No. of test	Position	Maximum temperature in C.	Results on				
			Lice	Nits	*B. typhosus*	*S. aureus*	*B. coli*
11	Same as Test 6	48°	Not killed	Not killed	Not killed	Not killed	Not killed
12	Same as Test 7	84°	Killed	Killed	Not killed	Not killed	Not killed
13	Same as Test 8	60°	Killed	Killed	Killed	Not killed	Not killed
14	Same as Test 9	102°	Killed	Killed	Killed	Not killed	Not killed
15	Control lice and nits kept at room temperature. Lice all active on examination; nits hatched normally.						

Remarks.—After Experiment II the legs of the brazier were shortened so that the bottom of the brazier was only one foot from the floor.

The typhoid khaki was exposed to the hot air in duplicate, viz., in closed and in open Petri dishes, without any difference in result. Control plates containing non-infected khaki gave sterile results, showing that the sterilization of the khaki-containing Petris was efficient.

EXPERIMENT IV.—April 17, 1917. Temperature as recorded by Door Thermometer, Bulb Four Inches from Floor, 60° C. for Thirty Minutes.

No. of test	Position	Maximum temperature in C.	Results on				
			Lice	Nits	*B. typhosus*	*S. aureus*	*B. coli*
16	Lice and Petris as in Tests 6 and 11; nits in pocket laid on four thicknesses of blanket and covered with four thicknesses of blanket, close to the lice and petris	68°	Killed	Killed	Not killed	Not killed	Not killed
17	Lice boxes and Petris as in Tests 2, 7, and 12; nits in pocket enclosed in blankets as in Test 16	96°	Killed	Killed	Accidentally destroyed	Accidentally destroyed	Accidentally destroyed
18	Lice boxes and Petris as in Tests 8 and 13; nits in pocket enclosed in blankets as in Tests 16 and 17	78°	Killed	Killed	Not killed	Not killed	Not killed
19	Lice boxes and Petris as in Tests 4, 9, and 14; nits in pocket enclosed in blankets as in Tests 16, 17, and 18	120°	Killed	Killed	Not killed	Not killed	Not killed
20	Control lice and nits kept at room temperature. Lice all active on examination; nits hatched normally						

Remarks.—The maximum thermometer was laid beside the lice boxes; there was no thermometer actually beside the nit pockets, i.e., within the blankets. *The brazier legs are now only 4 inches high, i.e., 8 inches shorter than in Experiment III; the cold air inlet beneath the brazier is now only 2 inches high, thus leaving an air space of only 2 inches between bottom of brazier and air inlet.* The comparatively high temperature of 68° C. obtained 18 inches from the floor (in extremely cold, snowy weather) is almost certainly due to the much lower position of the brazier. It is essential to place the bulb of the door thermometer a few inches from the floor, for if the temperature in the lowest air stratum is effective in killing that in the upper strata is more than effective.

EXPERIMENT V.—April 20, 1917. Door Thermometer 60° C. for Fifteen Minutes, Bulb Four Inches from Floor.

No. of test	Position	Maximum temperature in C.	Results on				
			Lice	Nits	*B. typhosus*	*S. aureus*	*B. coli*
21	9 in. from floor, 4 ft. 6 in. from brazier	31°	Not all killed	Not killed	Not killed	Not killed	Not killed
22	Second tier as in Test 2	51·5°	Killed	Not killed	Not killed	Not killed	Not killed
23	First tier as in Test 3, but 3 ft. 6 in. from brazier	46°	Some killed; most survived	Not killed	Not killed	Not killed	Not killed
24	Third tier as in Test 4	51·6°	Killed	Killed in pocket, but not in box	Not killed	Not killed	Not killed
25	Control lice and nits kept at room temperature. Lice all active on examination; nits hatched normally						

Results.—The open lice boxes, the nit pockets, the maximum thermometers, and the Petris were laid on four thicknesses of blanket and covered with four thicknesses of blanket. After placing the glowing brazier in position thirty-five minutes elapsed before the thermometer reached 60° C. A maximum thermometer laid on the floor 4 feet 2 inches from brazier, exposed to the hot air and unprotected by blankets, recorded 32° C.

EXPERIMENT VI.—April 24, 1917. Door Thermometer 60° C. for Thirty Minutes, Bulb Four inches from Floor.

No. of test	Position	Maximum temperature in C.	Results on	
			Lice	Nits
26	Inside fork of *dry* khaki trousers, 1 ft. from ground, and 3 ft. 9 in. from brazier	55°	Killed	Killed
27	In armpit of *wet* khaki tunic; 1 ft. from ground, and 3 ft. 9 in. from brazier	57°	Killed	Killed
28	Inside fork of *wet* khaki trousers, 4 ft. from ground, and 3 ft. 6 in. from brazier	55°	Killed	Killed
29	In puckered fold of *dry* blanket 4 ft. from ground, and 3 ft. 6 in. from brazier	73°	Killed	Killed
30	Control lice and nits kept at room temperature. Lice all active on examination; nits hatched normally			

Remarks.—In the two wet tests, 27 and 28, the tunic and the trousers were immersed in a pailful of water and wrung out so as to correspond to a good soaking with rain; the nit-containing pocket was also soaked in water; along with the unlidded lice box, and the thermometer bulb, it was placed in a wetted thin gauze bag, three inches square, which was pinned into the position indicated. In the two dry tests, 26 and 29, the nit-containing pocket, together with the unlidded lice box and the thermometer bulb, was placed in gauze bag which was pinned into position indicated.

EXPERIMENT VII.—April 27, 1917. Door Temperature 60° C. for Sixty Minutes.

No. of test	Position	Maximum temperature in C.	Results on	
			Lice	Nits
31	Nit pocket pinned inside fork of *dry* trousers; lice box in pocket; other details as in Test 26	64°	Killed	Killed
32	Nit pocket pinned in the farthest recess of inside fold of *wet* kilt; lice box inside it; other details as in Test 27	60°	Killed	Killed
33	Nit pocket and lice box in fork of *wet* trousers; other details as in Test 28	55°	Killed	Killed
34	Nits and lice in armpit of *dry* tunic, 1 in. from floor, 4 ft. from brazier	43°	None killed	Number hatched
35	Control lice and nits kept at room temperature. Lice all living when examined; nits hatched normally.			

Remarks.—Experiments VI and VII differ in *time of exposure*, and are therefore to be carefully compared; Test 26 with 31, 27 with 32, 28 with 33. Test 34 was substituted in place of a repetition of 29. The maximum thermometers were placed with bulbs close to lice and nits. The kilt straps were not perished.

EXPERIMENT VIII.—May 1, 1917. Sixty Minutes at 60° C., as Recorded by Door Thermometer.

No. of test	Position	Maximum temperature in C.	Results on nits
36	Nit pocket pinned within fold of *dry* kilt, lower edge 10 in. from floor, 3 ft. from brazier; thermometer bulb 4 in. lower	80°	Killed
37	*Wet* tunic; wetted nit pockets in armpit, 5 ft. from floor; thermometer bulb and nits on the same level	61°	Killed
38	*Wet* trousers; wetted nit pockets in fork, 2½ ft. from ground	56°	Killed
39	*Dry* trousers; nits in fork, 7 ft. from ground	108°	Killed
40	Control nits kept at room temperature; hatched normally after incubation		

Remarks.—After sixty minutes at 60° C., the nit-pockets on the dry things (36 and 39) were removed from the hut. The nit-pockets (37 and 38) remained attached to the wet garments while these, in order to dry them, were exposed for another twenty-five minutes at 60° C. plus the thirty minutes required to regain this temperature after opening the hut.

EXPERIMENT IX.—May 4, 1917. Thirty Minutes at 65° C. (Thermometer Four Inches from Ground).

No. of test	Position	Maximum temperature in C.	Results on nits
41	Fork of trousers *on floor* 5 ft. from brazier	31°	Not killed
42	Fork of trousers 1 ft. above floor; 4 ft. 8 in. from brazier, separated by two hangings of blankets	70°	Killed
43	Armpit of tunic 2 ft. from floor, behind 3 hangings; 5 ft. 6 in. from brazier	84°	Killed
44	Kilt 3 ft. from ground, behind two hangings, 6 ft. from brazier	73°	Killed
45	Control nits kept at room temperature; hatched normally after incubation		

Remarks.—Two thermometers were placed behind door; bulb of one 4 inches from floor, of the other 2 feet 6 inches from floor. The fire was a very good one, just approaching its best, carried in at 10.20; in twenty-five minutes, i.e., 10.45, the low thermometer was 50°, the upper 60°; in forty-five minutes, i.e., 11.5, the low thermometer was 60°, the upper 70°; in eighty minutes, i.e., 11.40, the low thermometer was 65°, the upper 74; in ninty-five minutes, i.e., 11.55, the low thermometer was still 65°, the upper 80°.

EXPERIMENT X.—May 11, 1917. Door Thermometer 65° C. for Twenty Minutes.

No. of test	Position	Maximum temperature in C.	Results on	
			Nits	Leather
46	Fork of trousers, 1 ft. from ground, 4 ft. from brazier, behind screen of two hangings of blankets	61°	Killed	Not injured
47	Fold of kilt, 6 in. from floor behind two hangings, 4 ft. 9 in. from brazier	56°	Killed	Not injured
48	Fork of trousers, 6 ft. 8 in. from brazier, 18 in. from ground, behind one hanging	58°	Killed	Not injured
49	In armpit of tunic, 2 ft. from ground, behind two hangings, 5 ft. 6 in. from brazier	63°	Killed	Not injured
50	Control nits kept at room temperature; normally hatched after incubation			

Remarks.—At 10.25 two door thermometers were placed in position, the bulb of the upper 2 feet 6 inches from floor, of lower at 4 inches. A glowing brazier just approaching its best, containing the usual 40 pounds of coke, was placed in hut. The readings were: At 10.25 the lower thermometer was 30°, the upper 32°; at 10.55 the lower thermometer was 58°, the upper 58°; at 11.35 the lower thermometer was 65°, the upper 68°; at 11.55 the lower thermometer was 65°, the upper 73°. The door was opened several times during the last fifteen minutes to prevent temperature rising over 65° C. After ventilating hut, removing brazier, adding 10 pounds coke and replacing brazier, it took only thirty minutes to again reach 65° C.

Remarks concerning the Effect on Lice and Nits.

The effects of the exposure on the lice and nits fall into two categories: (1) in which the effects are optically visible with a magnification of about ten diameters; and (2) in which there were no immediate visible signs of the cause of death of the active lice, and it was necessary to incubate the eggs in order to test if they were killed or not.

The line of demarcation corresponds roughly with thirty minutes' exposure to a temperature below or above 60° C. It was quite possible to decide with accuracy after examination and before advices respecting the exposure came to hand whether the temperature had been above or below this point. If above, the nits were collapsed or shrivelled, and the bodies of the lice were dried up, discoloured, or brittle, according to the extent of the rise above 60° C. If below, the lice would be soft, and not much, if at all, discoloured, while the appearance of the nits would be unchanged.

An outstanding feature of the action of heat on nits is the very narrow range of its variable action. Only in one instance was there any evidence of partial action, and in this case the recorded temperature, 51·5° C., killed all but two or three nits out of over fifty exposed.

Effect on Clothing and Blankets.—No injury to any of the dry textiles or dry leather took place during the course of these tests.

It will be seen (1) that the records of the uncovered maximum thermo-

meters show clearly the stratified condition of the air in regard to temperature and the need for some efficient means of equalizing the temperature throughout the hut. (In regard to this, see the Notes on this subject under the heading of Recommendations on p. 455).

(2) The effect of shortening the legs of the brazier indicates that the nearer to the floor level the source of heat is situated, the higher the temperature of the lower air strata, and the more quickly lethal temperature at this level will be attained.

(3) The use of a door thermometer affords no guide to the exact conditions of temperature throughout the hut. If, however, the door thermometer is placed at so low a level (say four inches), as to be beneath any garment that is in process of disinfestation, its record of a lethal temperature for the necessary period of time may be generally taken as sound evidence of disinfestation.

(4) That the minimum temperature recorded by the maximum thermometer as killing the nits was 51° C. (Experiment V, Test No. 24), with the door thermometer standing at 60° C. for fifteen minutes. As, however, in this test, the box of lice, pockets of nits, and maximum thermometer, were protected by four thicknesses of blankets, while in another experiment (Experiment I, Test No. 3), without any protection, the nits were not killed at 53° C., there is a discrepancy which requires explanation. Most probably Test No. 24, as recorded, is misleading, owing to an unequal penetration of heat throughout the fourfold covering of blanket to the maximum thermometer on the one hand, and the nits on the other. That this may be the explanation seems quite possible, as, judging by analogy with Tests 9 and 19, the temperature outside the protecting blankets would be over 100° C.

Apart from this doubtful record of Test No. 24 in Experiment V, the minimum heat and periods proved to be efficient for disinfestation were 56° C. for twenty minutes (Experiment X, Test No. 47), and 55° C. for thirty minutes (Experiment VI, Tests Nos. 26 and 28). In Test No. 47 the nits were not only protected by the khaki cloth of which the pocket containing them was constructed, but were further protected in the folds of a kilt; while the pockets of nits, in the cases of Nos. 26 and 28, were placed in the fork of a pair of trousers, which, in No. 28, had been previously wetted.

(5) That although the evidence is not exact with regard to the times for which these temperatures were maintained it is probable that they would be less, rather than greater, than the periods for which the door thermometer was maintained at 65° C. in the case of Experiment X, and at 60° C. in the case of Nos. 26 and 28.

(6) That mixed wet and dry garments should not be treated in the same load, as there is not only the danger of nits in wet garments escaping destruction, but, if there are many wet garments, of their reducing the temperature to which dry garments in their proximity are also exposed.

(7) That garments or blankets should not be either bundled or folded

closely together, nor must they on any account be hung so low that any portion of them comes within a foot of the floor or the level of the door thermometer when this is above floor level.

(8) That the bacteria tested were not killed by the temperature indicated in the charts. Tests Nos. 2, 9, and 13 were exceptions to this rule in so far that "no growth" occurred in the bouillon used to test sterility; in view of the very numerous positive results, it is doubtful if these negative cases can be regarded except in the light of freaks.

Recommendations and Suggested Improvements.

(1) *Working Temperature.*—While the experiments show that 55° C. is amply sufficient to destroy both lice and nits, even when protected by more than one thickness of khaki cloth, it must be borne in mind that this temperature was recorded by a maximum thermometer placed in close proximity to the nits and that *the door thermometer* registered 60° C. during the course of the trial. As in practice it is the door thermometer which must be relied upon for evidence of exposure, it is necessary that the safety margin of temperature be fixed in relation to this. In fixing 65° C. for thirty minutes as the door thermometer level in a hut such as the one experimented with at Shorncliffe, a very ample margin for contingencies, such as undue folding, overlapping, over-crowding, damp garments and faulty attention, has been allowed. In huts or heating chambers in which the recommendations and suggested improvements here set forth are adopted it will be quite possible to reduce this margin very considerably, with a corresponding saving in fuel without any danger to its efficiency. A thoroughly well constructed and efficiently worked hot chamber ought to be able to run with perfect safety at 55° C.

(2) The equalization of temperature throughout a hut or hut chamber is of great importance if efficiency and economy in working are considered. Further, upon it depends the absence of damage to fabrics and leather by overheating, and in greater measure freedom from fires which may be caused by collections of fluff in a ventilator being set alight. An electric or other mechanically driven, or even hand-driven fan, would seem to promise most success in this direction. Its installation should soon pay for itself out of economies in fuel and speed of working, as the period before the desired temperature is attained at the lower levels would be shorter, owing to the excess of heat which is wasted at the higher strata being available in proximity to the floor.

(3) In the door should be a plate glass window opposite the thermometer index. This window should be readily openable as condensation of moisture may render the scale illegible; the bulb of the thermometer, unless there be a trustworthy means of equalizing the temperature, being not more than four inches from the floor.

(4) That bars or wires should be arranged at right angles to the length

of the hut. In the Moore Barracks hut they are unfortunately parallel with the length of the hut, so that the blankets on the bars nearest the brazier act as screens or heat-barriers to those nearer the wall.

(5) *Wet*, as distinguished from *damp*, garments or blankets, must be either dried before treatment, or the exposure period must be increased according to the load, probably an hour at 65° C. would be sufficient, but the point has not been tested with a full load of soaked clothing or blankets. The safe guide is that, if clothing or blankets are dry when they come out, after exposure to this temperature, they will also be disinfested.

(6) Blankets and clothing must not be folded or bundled or closely pressed together. Blankets ought not to come within a foot of the floor; this is especially necessary in the case of a concrete floor without a non-conducting air-space underneath, or a wooden flooring above, for in the experiments lice and nits on and within a few inches of the concrete floor always survived.

(7) The temperatures necessary for the destruction of insect vermin and bacteria are shown to be of so different an order that it is well to clearly separate the idea of disinfestation from that of disinfection. The latter should never be attempted as an adjunct to the destruction of lice. When it is of importance for blankets or clothing to be disinfected it should be considered as a separate problem. In such cases the presence of insect vermin may be as a general rule ignored, as the means employed (for instance, steam) to disinfect will necessarily disinfest also, with the exception of formalin vapour below 55° C., and Clayton gas in respect of a small percentage of the nits.

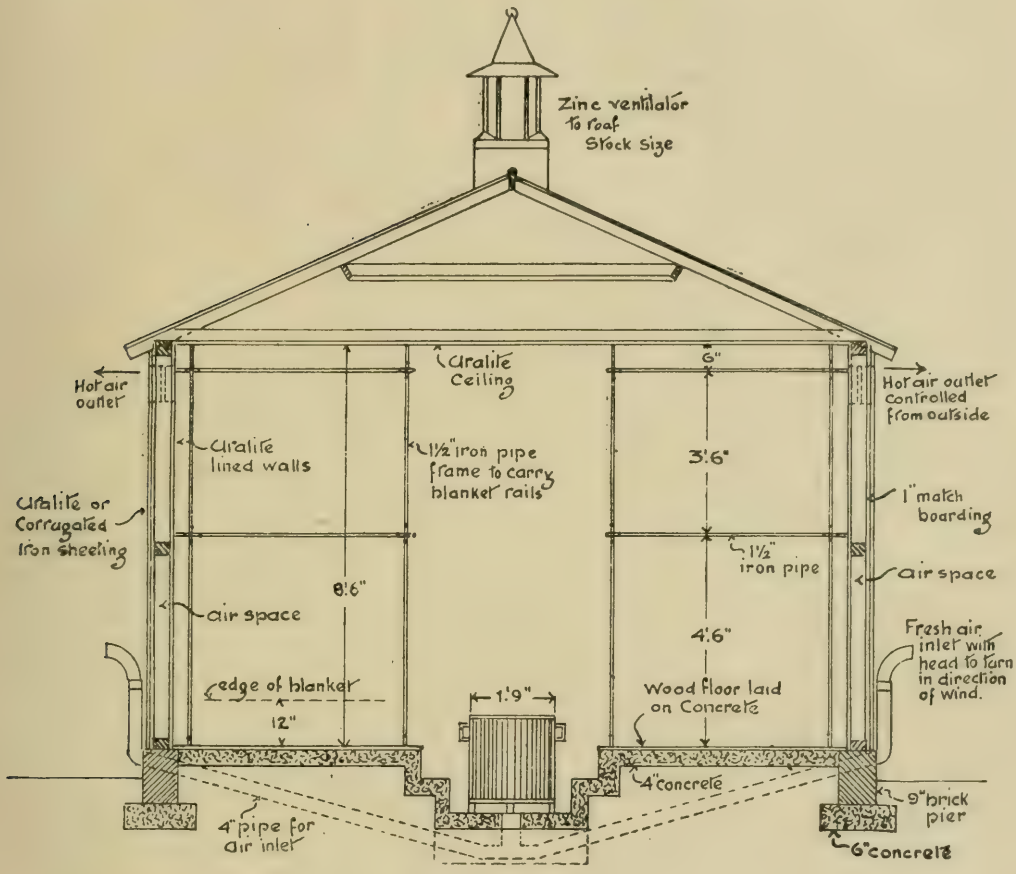
(8) The blankets or garments after treatment should never be thrown or dropped on to the floor of the hut, as this will probably harbour living lice which have dropped off the infested articles; the regular washing of the floor of disinfesting huts or transport wagons with a two per cent solution of cresol soap emulsion or lysol is necessary. An alternative method would be to sprinkle or dust them with powdered naphthalene before each day's work. For this purpose the cheapest kind of crude naphthalene available would serve; about twelve grammes, say $\frac{1}{2}$ ounce per square yard being required.

(9) Those who handle infested and disinfested material ought to wear different overalls with hoods for loading infested and for unloading disinfested material, and infested and disinfested things ought not to be stored in the same spot.

(10) Attention to the service of loading and unloading is very necessary, as otherwise a certain number of cases may occur in which clothing or blankets have apparently escaped sterilization, whereas they have been reinfested when being unloaded by men who have temporarily infested themselves whilst loading the hut.

SUGGESTIONS FOR AN IMPROVED HOT-AIR HUT. (PLANS 2, 3 AND 4.)

In view of the difficulties and the unsatisfactory points referred to, the following improvements and alterations are suggested in the arrangement of fittings and construction of new permanent hot-air disinfestation huts (see plans on pp. 457, 458 and 459).

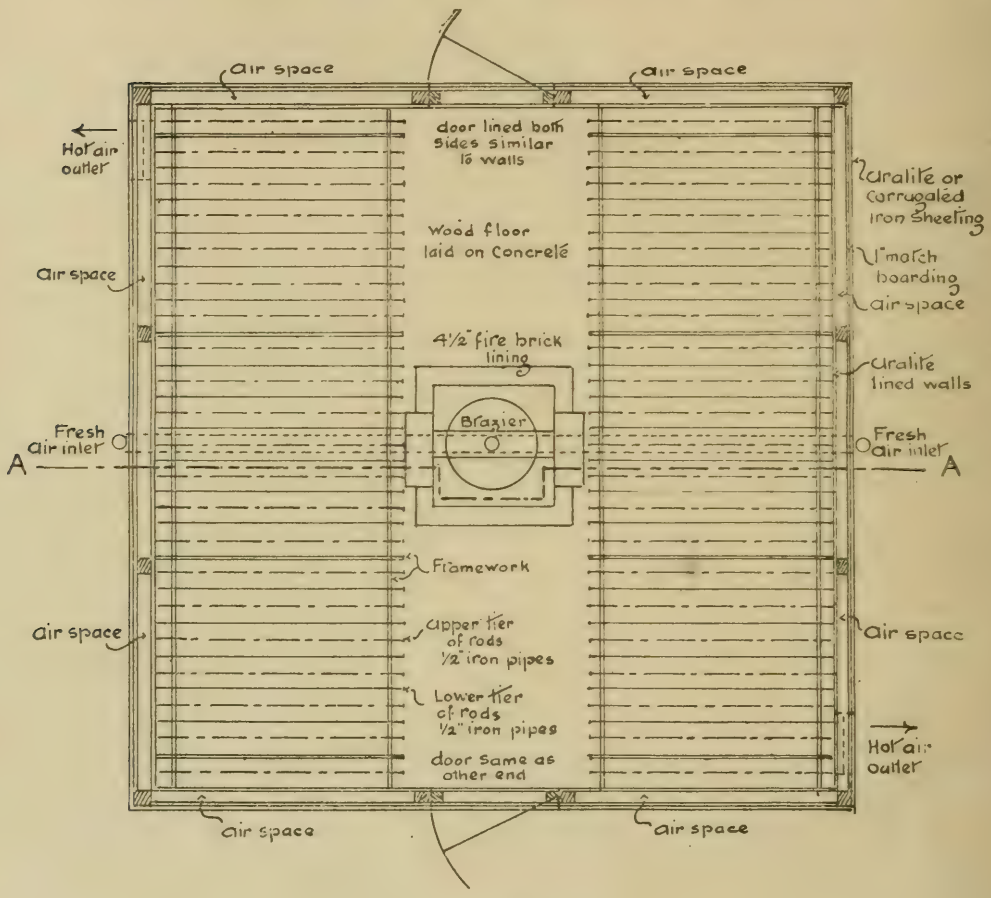


PLAN 2.—Section A.A.

(1) Dimensions of a single [1] (not a double) hut should be fifteen feet square, and eight feet six inches from floor to ceiling. There should be two doors, opposite one another, one for the entrance of infested material and

[1] As already stated, the hut at Shorncliffe is a double hut, the original idea being that, while disinfestation was proceeding in one half-hut, the other was being unloaded and loaded. But such simultaneous working of both half-huts was not practised, because (*a*) the simultaneous use of both prevents quick through ventilation (by opening the partition door) of any of them, and (*b*) a second fatigue party of seven men, and more storage

the other for the exit of disinfested material; also for rapid through ventilation; each should lead to a receiving or dispatching station or room. The floor should, in order to conserve heat in the hut, be a non-conductor, e.g., of concrete constructed on sleeper walls, with an air-space; or of coke brieze concrete covered by $\frac{3}{4}$-inch flooring, and



PLAN 3.—Ground plan.

this again opposite the door (or doors) used for the brazier by a sheet of iron. A hut so constructed would heat more rapidly with a smaller consumption of fuel, and would not lose heat so readily.

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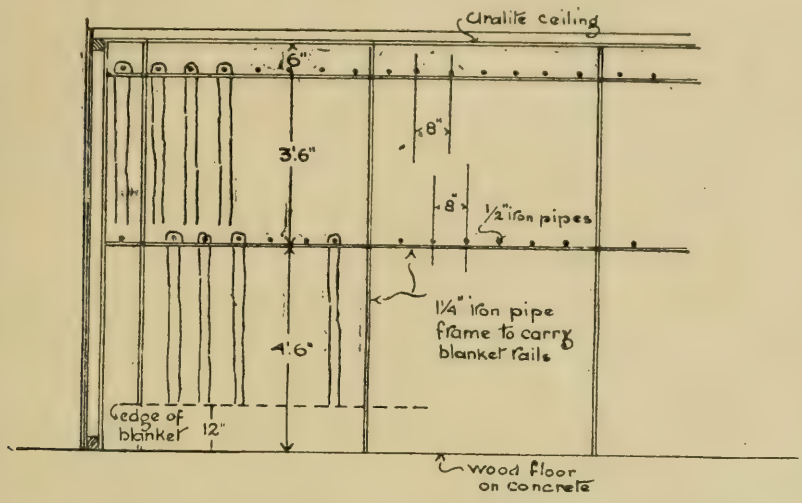
room, are required, and this excess of men and material within a restricted area leads to confusion both of men and material, and retards smooth working. Besides, in the majority of units on Home Service, a single hut which will disinfest 1,500 blankets a day in five loads, is doing all that is required. By working two shifts within twenty-four hours twice this number can be disinfested.

(2) The walls may be constructed of 3-inch by 2-inch timbers with uralite sheets, or other fire-proof, non-conducting material, each side, or with uralite inside and corrugated iron outside; the 3-inch air-lock between the outer and inner walls is best left free of sawdust, as, if the latter becomes wet it acts as a dissipator of heat.

(3) The brazier should stand in a saucer-shaped well 12 inches below floor level; this should be lined with asbestos, cement, or fireclay; as 12 inches is too deep a step over which to carry a loaded brazier, a step 6 inches deep is required on each side of the well.



Sketch showing upper and lower tiers of rails for blankets, and blankets in position.

PLAN 4.—Improved design of a hot-air hut, by Captain J. T. Grant.
(Drawn by Serjt. F. G. Grierson, 1st London Sanitary Company).
Scale ¼ of an inch = 1 foot.

(4) A cold-air inlet should be provided on each side of the hut by a six-inch pipe running under the floor and opening under the centre of brazier; the terminal part under the brazier ought to be detachable in order to facilitate removal of cinders. At the outer end should be, to suit the direction of the wind, a movable bent cowl, two feet six inches from the ground (see plan).

(5) A louvred or other ventilator on the roof is needed to prevent overheating (in the absence of a fan) of the roof space, which acts as an air-lock to the ceiling. The trapdoor in the ceiling should be abolished, and in its stead should be introduced a hot-air outlet in the shape of a grating one foot square in each side wall, near the ceiling, at diagonally opposite corners of the hut; each outlet should be controllable by a chain or rope from outside, the current or movement of the hot air thereby obtainable aids penetration of heat into the materials.

(6) The tiers of bars should be two in number, upper and lower; the height of the lower should be 4 feet 6 inches from the ground, so that a 7-foot blanket extending downwards 3 feet 6 inches on either side of the bar does not come within 12 inches of the floor. The upper should be 3 feet 6 inches above the lower, and the upper bars should be opposite the lower spaces, not the lower bars, i.e., the first bar of the upper tier would be 4 inches from the wall, the first bar of the lower tier 8 inches from wall. The distance between bars should be eight inches. Not less than one foot of

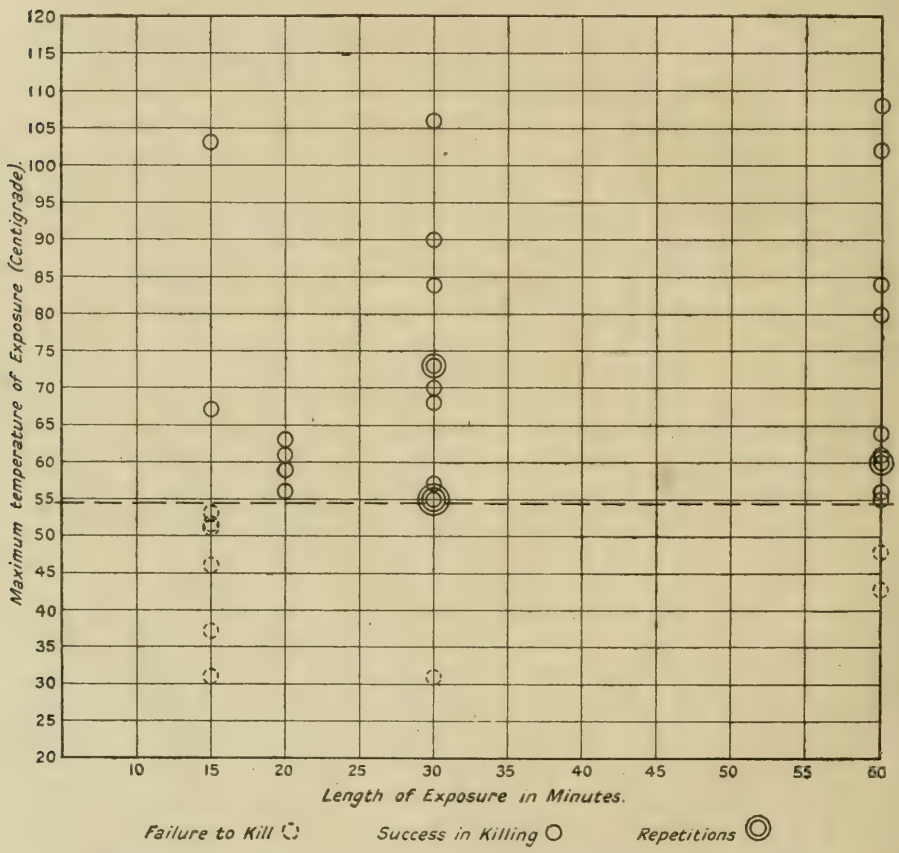


Diagram of experimental results, Hot-air Disinfestation Hut, Moore Barracks Hospital, Shorncliffe.

bar length should be allowed for carrying each puckered blanket; thus a four-feet bar takes four blankets, each arranged as already described. Slideable hooks on the bars, like curtain rings, are useful for attaching tunics, greatcoats, kilts, slacks, etc.

(7) A heat deflector, in the form of a sheet of iron should be placed across the mouth of the glowing brazier.

It may be mentioned that an improvisable and portable hot-air hut made of double walls of canvas, with a three-inch air space, has been found successful by Captain Grant and Lieutenant Peacock, the sources of heat being braziers formed of oil-drums converted into cradles and riddled with holes one inch in diameter.

A method of heating by flues connected with a furnace burning all kinds of fuel, including camp refuse, is under consideration.

The chart on p. 460 shows graphically the results of thirty-six tests (Tests Nos. 16, 17, 18 and 19 in Experiment IV. being omitted). It is to be noted that all the exposures at 55° C. or above were completely successful in the destruction of both active lice and nits, even when the exposure was no longer than fifteen minutes. Temperatures below 50° C. failed to kill. In the case of the three exposures between 50° C. and 55° C. the effect of the heat was variable ; while all the active lice were destroyed, a few of the nits survived and hatched. The dotted line therefore indicates the safety limit of temperature under the conditions of test.

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THE DETECTION OF SLIGHT DILATATION OF THE HEART.

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A very large number of cases are seen in military practice in which the detection of *slight* dilatation of the left side of the heart is important.

We need not refer to the well-marked cardiac dilatation in valvular diseases, cardiac overstrain, "soldiers' heart," and marked disordered action of the heart. In this article we shall consider only the *slight* cardiac dilatation which may be detected in certain cases where the symptoms and signs are not marked. Different diagnoses are often given in such cases and not infrequently the men are regarded as malingerers.

Thus, to mention well-known instances—a man who appears healthy is called up for, or has been passed for, military service. He considers he is not suitable for active service, on account of shortness of breath on slight exertion, and requests a medical report on the condition of his heart. A soldier complains that he is unable to continue his duties or return to his duties, on account of shortness of breath on slight exertion, or of supposed cardiac affection. A discharged soldier when called up before a medical board complains that he is still unable to follow his employment on account of symptoms which he considers to be due to heart affection, and the question of continuing his pension has to be considered.

On examination of a large proportion of these cases we find no cardiac murmur, no signs of *well-marked* dilatation of the heart. The heart sounds are occasionally irregular or intermittent; but very often the heart sounds are regular and normal. We have no œdema or definite signs of failing heart, but the man complaims that on slight exertion he is very short of breath, and suffers from palpitation or dizziness, and occasionally from pain in the cardiac region, and that he is unable to do his duties on account of these symptoms.

Valvular disease of the heart, marked irregular cardiac action, *well-marked* dilatation of the heart, disease or affections of other organs, dyspepsia, flatulence, etc., can be excluded. In some of these cases the men are certainly malingerers or neurasthenic, or neurotic, and on careful examination of the cardiac dullness we find it normal. But in certain other cases, on very careful examination, we are able to detect *slight* but definite increase of the cardiac dullness to the left, indicating slight dilatation of the left ventricle of the heart. In many of these cases, on direct percussion over the apex of the heart (with the tip of the finger) the patient complains of tenderness or pain; occasionally he feels faint, and occasionally an attack of well-marked syncope will be produced thereby.

Other medical men, who have carefully examined the cardiac dullness,

will have found this slight increase in many cases in which the soldier complains of the symptoms just named, and will also have noted the tenderness on direct percussion over the apex and the occasional attacks of syncope produced.

I think we may regard this slight cardiac dilatation with cardiac muscle weakness as the cause of the symptoms in such cases, and at least as an indication against the diagnosis of malingering. The *slight* dilatation can only be determined by carefully mapping out the cardiac dullness, and also by *taking into consideration chest measurements.*

In this article I desire to consider (1) methods of sharply defining the cardiac dullness to the left; and (2) what are to be regarded as definite indications of slight cardiac dilatation from the extent of the cardiac dullness?

(I) Methods by which we may determine Dilatation of the Heart to the Left.

Before examining for the signs of slight cardiac dilatation we must exclude affections on the right side of the chest (such as pleuritic effusion) which might push the heart to the left.

Having done this, indications of the size of the left ventricle, as all medical practitioners are aware, are obtained from the position of the apex impulse, determined by inspection and palpation of the chest, or by placing the end of the stethoscope over the fifth intercostal space near the nipple line and noting the point where the pulsation is most marked, as indicated by the movement of the other end of the stethoscope. Also we have another indication of the position of the apex by noting the point at which the heart sounds are heard most distinctly by means of the stethoscope. This is occasionally of service where the other indications are indefinite. These are sufficient indications in many cases of marked dilatation, but of course percussion should always be carried out. In the cases of *slight* dilatation considered in this article, percussion should be carried out very carefully, otherwise the dilatation will be overlooked.

Percussion of the left limit of the heart is usually carried out by placing the index or middle finger of the left hand in the fifth intercostal space over the lung area and percussing it repeatedly with the index or middle finger of the right hand—passing from the lung area towards the middle line. A dull note is obtained when the left limit of the heart is reached, and also the resistance is greater. But sometimes the difference is not sharply defined, and in most cases I much prefer *direct* percussion of the intercostal space with the tip of the middle finger of the right hand. The skin over the fifth intercostal space is directly percussed forcibly and repeatedly with the tip of the examiner's right middle finger, no finger of the left hand intervening, from the lung area to the cardiac region. On reaching the left limit of the heart the percussion note is *duller* and the *feeling of resistance* to the tip of the percussing finger is much greater over

the cardiac area than over the lung area. The greater resistance is often more easily determined than the duller percussion sound, and is as definite an indication of the limit of cardiac dullness, and for my own part I much prefer this *direct* method of percussion to the usual method, in most cases. I can much more readily distinguish the difference between the percussion resistance and the percussion note over the lung and cardiac areas respectively by this direct method, and can in most cases more sharply and clearly map out the left limit of the heart by this method than by the ordinary method.

The apex of the heart may also be mapped out with *two coins*—a shilling and a sixpence. The examiner holds the sixpence firmly in contact with the patient's chest and percusses it *very forcibly* with the rim of the shilling. By practice he is able to recognize distinctly the difference of the sound and of the feeling of resistance over the lung and cardiac areas.

The following is the way of holding the coins which is most convenient to myself. The examiner places the sixpence over the patient's left fifth intercostal space (well outside the nipple line) with the rim of the sixpence just above the upper edge of the sixth rib. He holds his left hand above the sixpence and presses its flat surface firmly in contact with the patient's skin (pressing its lower rim especially well into the intercostal space) with the left forefinger and thumb held at the rim of the sixpence (at the ends of its transverse diameter), the former on the axillary side, the latter on the sternal side of the sixpence. He percusses the centre of the sixpence with the rim of the shilling which he holds firmly between the tips of the right middle finger and thumb placed at the centre of the percussing shilling and the tip of the index finger placed on its rim.

The sixpence is placed in contact with the chest first over the lung area well outside the cardiac area, and then gradually moved towards the sternum as different parts of the fifth intercostal space are percussed. When the left limit of the heart is reached, the percussion sounds obtained by percussion with the coins are more sharply defined in the dull and resonant areas than by percussion with the fingers in the ordinary manner, and the feeling of resistance is different in the two areas. The cardiac area is duller and more resistant than the lung area. When the limit of dullness is fixed the chest is marked with a pen or blue pencil just below the lower end of the vertical diameter of the sixpence which is in contact with the chest. (Sometimes the limit can be so sharply defined that when the sixpence is placed with its vertical diameter exactly over the limit of the cardiac dullness, the percussion note over the sternal half of the sixpence is duller and the feeling more resistant than over the other half.) The difference in the percussion sounds over the cardiac area and the lung area, when two coins are used cannot be described in words, but with practice I think most medical men will be able to distinguish the difference and also to feel the difference in resistance.

(Another method of fixing the cardiac dullness is by percussion of the

sixth rib directly with the finger from the left to the middle line. The note is different when the left limit of the heart is reached. But the limit of this dullness is always less than that obtained by percussing the interspace and is useful only as a rough estimate.)

In marking the limit of the cardiac dullness, when the chest is percussed directly with the tip of the finger, the duller and more resisting part is reached, the finger is kept in contact with the patient's skin and a mark made with ink or blue pencil. The mark should not be made at the finger nail, nor at the palmar surface of the finger end, but at the exact tip of the terminal phalanx of the finger, about the middle of the tip of the finger, about $\frac{1}{8}$ inch from the inner side of the finger nail.

In certain cases when the patient is stout, percussion in the usual manner, indirectly, is the most satisfactory method. The middle finger of the left hand is placed vertically on the chest in the fifth intercostal space and this is percussed with the middle finger of the right hand, from the lung area to the cardiac area.

In other very stout men percussion of the chest in any way is often very unsatisfactory and the size of the left side of the heart must be determined from the position of the apex impulse if this can be seen or felt, or by noting the point at which the heart sounds are best heard in the interspace and marking this as the apex of the heart. In these cases the *slight* dilatation we are considering cannot be estimated.

(II) What are the Indications of slight Dilatation of the Heart?

Having mapped out the cardiac dullness on the chest, and marked the left limit by ink or blue pencil, we have next to decide if this is greater than the normal limit. We mark with blue pencil or ink the mid-sternal line at the level of the fifth intercostal space. We measure the distance of the extreme left of the cardiac dullness from the mid-sternal line and we have then to decide if this is greater than the normal limit. The left limit of the cardiac dullness is normally *about* three inches from the mid-sternal line in the fifth intercostal space, and is *about* $\frac{1}{2}$ inch within the nipple line. But the limit varies in healthy men, and it may be $3\frac{1}{2}$, $3\frac{3}{4}$, or occasionally even 4 inches from the mid-sternal line in very well-developed normal men. I have carefully measured the cardiac dullness from the mid-sternal line to the left limit in fifty soldiers *free from any signs or symptoms of cardiac disease* or from any medical ailment. The extent of the left limit of the cardiac dullness from mid-sternum was not over $3\frac{1}{2}$ inches in 46 cases (in 24 of these it was 3 inches or under). In 4 of the 50 cases it exceeded $3\frac{1}{2}$ inches (in 2 cases it was $3\frac{3}{4}$ inches, in 2 cases $3\frac{5}{8}$ inches), but in all of these the chest was well developed, and when compared with the chest measurement (as described in this article) the figures were under the normal limits.

This difference in the extent of the cardiac dullness in healthy men shows that we must consider other relations, besides the measurement of the left limit of the cardiac dullness from mid-sternum, before we can decide if the heart is *slightly* dilated. If we find then that the left limit of the cardiac dullness extends more than $3\frac{1}{2}$ inches from mid-sternum, before deciding that the heart is dilated we have to consider the relations of the cardiac dullness to the size of the chest. Three relations are useful: the relation to the transverse diameter of the chest, to the circumference of the chest, and to the nipple line.

In deciding if the heart is slightly dilated I have based my conclusion on four measurements:—

(1) The distance of the left limit of the cardiac dullness is measured from the mid-sternal line.

(2) The distance of the nipple line is measured from the mid-sternal line.

The transverse diameter of the left half of the chest is measured from the mid-sternal line at the level of the apex of the heart in the fifth interspace, the arms hanging down by the side, and the patient counting from one up to twenty rapidly. The chest is measured at the end of expiration. This half chest diameter may be measured in various ways. I usually employ two flat rulers marked in inches. One ruler (*a*) is placed in contact with the front of the chest horizontally; the other (*b*) is placed at right angles to it on the most prominent part of the side of the chest in the axillary region (felt by the hand). The second ruler (*b*) is held *exactly* at right angles to the first ruler (*a*) and the distance of the ruler (*b*) from the mid-sternal line is read off on the graduated transverse ruler (*a*) held in front of the chest.

Half the circumference of the chest is measured at the level of the apex of the heart in the fifth intercostal space. The tape measure is fixed at the mid-sternal line and passed horizontally round the left half of the chest at the level named and just under the scapula, the arms hanging down by the side. The tape measure is passed between the left arm and the chest, and the distance from mid-sternal line to the vertebral spines measured during expiration, whilst the man is counting twenty.

If we find the left limit of the cardiac dullness extends a little more than $3\frac{1}{2}$ inches from mid-sternal line this may be due to dilatation of the heart, but before we decide such is the case the other relations just named should be considered.

The nipple line is a useful indication in many cases and the left limit of the cardiac dullness in healthy men is usually $\frac{1}{2}$ inch inside the nipple line. If the dullness extends up to the nipple line cardiac dilatation is probable, but we have to remember that the nipple in males differs somewhat in the distance from the sternum. In most cases it is from $3\frac{1}{2}$ to $4\frac{1}{2}$ inches from mid-sternal line, occasionally 5 inches; so that if the nipple line is more than the usual distance from mid-sternum the heart might

be slightly dilated and the dullness still not up to the nipple line. (In the female the nipple line is, of course, not a satisfactory guide.)

From measurements in a large number of cases I have found the following relations of service: The distance of the left limit of the cardiac dullness from mid-sternum is normally not more (usually it is ¼ inch less) than two-thirds of the transverse diameter of the left half of the chest at the level of the apex in the fifth intercostal space.

The normal distance of the left limit of the cardiac dullness from mid-sternum is about one-fifth of the circumference of the left half of the chest at the level of the apex in the fifth intercostal space; it may be slightly more, but *is not so much* as ½ inch above this. If the patient is very stout the value of this measurement is greatly diminished, as the figure might then be so much increased that cardiac dullness, though increased, would not exceed it.

If the cardiac dullness were not greater in the chests of well-developed men, any increase over 3 or 3½ inches from the mid-sternum would indicate cardiac dilatation; but as already stated the dullness may be over 3½ inches in normal well-developed men. If we allow that the cardiac dullness is greater in well-developed chests and that it *increases in proportion* to the size of the chest, then the measurement just named will be a guide of practical importance. If the cardiac dullness is not greater in proportion to the size of the chest, then we shall underestimate the cardiac dilatation by basing it on the measurement named, but we shall be quite correct in our decision in the cases which we regard as dilated heart.

To state this in other form, I think we may say that a cardiac dullness not extending over 3½ inches from mid-sternum may be considered normal. But we may fairly regard the cardiac dullness to be increased and the heart dilated, if the left limit of the cardiac dullness extends :—

(1) More than 3½ inches from mid-sternum.

(2) If, at the same time, but not otherwise, it is *over* two-thirds of the transverse diameter of the left half of the chest at the level of the apex in the fifth intercostal space, and especially if it is ¼ inch more than this (i.e., if it is ½ inch over the normal limit).

(3) And if it is *as much as* ½ inch over one-fifth of the circumference of the left half of the chest at the level of the apex in the fifth space. We may say that normally the extent of the cardiac dullness is *not over* limit two and is *under* limit three.

(4) If the dullness extends to the nipple line this is also a point in favour of cardiac dilatation. When the dullness is only slightly increased sometimes it does not quite reach the nipple line, especially if the nipple is over the average distance from mid-sternum; but in other cases the dullness though only slightly increased reaches all of the four limits just named.

We find in a series of cases of soldiers who have not suffered from any cardiac symptoms or any medical affection that the cardiac dullness never exceeds the limits (2), (3) and (4) just indicated. In certain other cases

with the symptoms just described, shortness of breath, palpitation, cardiac pain, we find the cardiac dullness slightly exceeds the limits (1), (2) and (3) indicated in this article as the normal limits, and in such cases I think we are justified in regarding this slight increase of cardiac dullness as an indication of slight cardiac dilatation and an indication that the symptoms are not due to neurosis and also that the man is not malingering.

In all of the normal cases examined, the distance of the left limit of the cardiac dullness from the mid-sternal line was not more than two-thirds of the transverse diameter of the left half of the chest; usually it was at least $\frac{1}{4}$ inch less. An increase over two-thirds of the transverse diameter of the chest and especially an increase of $\frac{1}{4}$ inch over this (i.e., half over the usual limit) may I think be regarded as an indication of slight cardiac dilatation.

The distance of the left limit of the cardiac dullness from mid-sternum was about one-fifth of the half circumference of the chest at the level of the apex of the heart, sometimes a little more than one-fifth, but never over $\frac{1}{2}$ inch more than this. If $\frac{1}{2}$ inch more, this may be regarded as a sign of slight cardiac dilatation.

For example in Case 10, the cardiac dullness extended $3\frac{3}{4}$ inches from mid-sternum, but the transverse diameter of the left half of the chest was 6 inches and two-thirds of this is 4 inches. Half of the circumference of the chest at the level of the apex of the heart was $17\frac{1}{4}$, one-fifth of this is $3\frac{9}{20}$; if we add $\frac{1}{2}$ inch the figure is $3\frac{19}{20}$. The distance of the nipple line was $4\frac{3}{8}$. The extent of the cardiac dullness was thus less than all of these figures and may therefore be regarded as normal in this case. The man had no cardiac symptoms.

The following Table I gives the figures in ten of the fifty cases of normal soldiers examined. (These soldiers did not suffer from any symptoms of cardiac affection.)

TABLE I.—Relations of Cardiac Dullness to Chest Measurements in Normal Conditions.

Case	Distance of left limit of cardiac dullness from mid-sternal line	Distance of nipple line from mid-sternal line	Two-thirds of the maximum transverse diameter of left half of chest at level of apex of heart	One-fifth of the left half of the chest circumference, from mid-sternal line to vertebral spine, at level of apex of heart, plus $\frac{1}{2}$ inch
1	3 inches	$3\frac{5}{8}$ inches	$3\frac{2}{3}$ inches	$3\frac{6}{10}$ inches
2	3 ,,	4 ,,	$3\frac{2}{3}$,,	$3\frac{7}{10}$,,
3	$2\frac{3}{4}$,,	$4\frac{1}{4}$,,	$3\frac{5}{6}$,,	$3\frac{8}{10}$,,
4	$2\frac{7}{8}$,,	$3\frac{3}{4}$,,	4 ,,	$3\frac{9}{10}$,,
5	$2\frac{5}{8}$,,	$3\frac{1}{2}$,,	$3\frac{1}{3}$,,	$3\frac{4}{10}$,,
6	$3\frac{1}{4}$,,	$3\frac{7}{8}$,,	4 ,,	4 ,,
7	$3\frac{1}{2}$,,	$4\frac{1}{4}$,,	$4\frac{1}{6}$,,	$3\frac{9}{10}$,,
8	$3\frac{1}{2}$,,	$4\frac{1}{8}$,,	$3\frac{2}{3}$,,	$3\frac{19}{20}$,,
9	$3\frac{5}{8}$,,	$4\frac{5}{8}$,,	$4\frac{1}{4}$,,	4 ,,
10	$3\frac{3}{4}$,,	$4\frac{3}{8}$,,	4 ,,	$3\frac{19}{20}$,,

In a large number of the men who complained of the cardiac symptoms described in this article we find that the extent of the cardiac dullness exceeded the limits of the cardiac dullness in normal men.

Thus in Case 6 of the following Table II we find the cardiac dullness was $4\frac{1}{8}$ inches from mid-sternum, i.e., more than $\frac{1}{2}$ inch beyond the usual limit: but as already stated this limit may be exceeded in healthy men when the man is well developed and the chest large. We find in this case that the cardiac dullness extended up to the nipple line which was $4\frac{1}{8}$ inches from mid-sternum. Also the transverse diameter of the left half of the chest was $5\frac{1}{4}$ inches and therefore not above the average; and two-thirds of this diameter is $3\frac{1}{2}$ inches. The circumference of the left half of the chest at the level of the apex of the heart was fifteen inches. One fifth of this is three inches and if we add $\frac{1}{2}$ inch the figure is $3\frac{1}{2}$. The limits of this cardiac dullness thus exceeded all the limits and relations found in healthy men, and the heart may be regarded as dilated. The man complained of the cardiac symptoms described in this article.

In Case 3 the left limit of the cardiac dullness was $3\frac{3}{4}$ inches from mid-sternum and this extent may be noted in some healthy men; but we find that the relations to chest measurements show that the limit is abnormal in this case. We find that the transverse diameter of the left half of the chest was $4\frac{7}{8}$: two-thirds of this is $3\frac{1}{4}$. The circumference of the left half of the chest at the level of the apex of the heart was $15\frac{3}{4}$ inches. One-fifth of this was $3\frac{3}{20}$; if we add $\frac{1}{2}$ inch we have the figure $3\frac{13}{20}$. The cardiac dullness thus exceeded all the limits and relations found in healthy men and the heart may be regarded as dilated. The man complained of cardiac symptoms.

TABLE II.—Relations of Cardiac Dullness to Chest Measurements when the Heart was slightly dilated.

Case	Distance of left limit of cardiac dullness from mid-sternal line	Distance of nipple line from mid-sternal line	Two-thirds of maximum transverse diameter of left half of chest at level of apex of heart	One-fifth of circumference of left half of chest, from mid-sternal line to vertebral spine, at level of apex of heart, plus $\frac{1}{2}$ inch
1	$3\frac{7}{8}$ inches	$3\frac{7}{8}$ inches	$3\frac{5}{12}$ inches	$3\frac{6}{10}$ inches
2	$3\frac{1}{2}$,,	4 ,,	$3\frac{1}{2}$,,	$3\frac{6}{10}$,,
3	$3\frac{3}{4}$,,	$4\frac{1}{4}$,,	$3\frac{1}{4}$,,	$3\frac{13}{20}$,,
4	$3\frac{7}{8}$,,	$3\frac{7}{8}$,,	$3\frac{1}{2}$,,	$3\frac{13}{20}$,,
5	$4\frac{1}{8}$,,	$4\frac{1}{8}$,,	$3\frac{3}{4}$,,	$3\frac{4}{5}$,,
6	$4\frac{1}{8}$,,	$4\frac{1}{8}$,,	$3\frac{1}{2}$,,	$3\frac{1}{2}$,,
7	$4\frac{1}{2}$,,	$4\frac{3}{4}$,,	$3\frac{2}{3}$,,	$3\frac{7}{10}$,,
8	$4\frac{1}{2}$,,	$4\frac{1}{2}$,,	$3\frac{2}{3}$,,	4 ,,
9	4 ,,	4 ,,	$3\frac{2}{3}$,,	$3\frac{3}{4}$,,
10	4 ,,	4 ,,	$3\frac{1}{2}$,,	$3\frac{13}{20}$,,

In Case 10 the left limit of the cardiac dullness was four inches from mid-sternum, i.e., over the normal limit for most healthy men. We find

that the transverse diameter of the left half of the chest was $5\frac{1}{4}$ inches. Two-thirds of this is $3\frac{1}{2}$ inches. This was exceeded by the cardiac dullness. The circumference of the left half of the chest at the level of the apex was $15\frac{3}{4}$ inches. One-fifth of this is $3\frac{3}{20}$. If we add $\frac{1}{2}$ inch the figure is $3\frac{13}{20}$. This is also exceeded by the cardiac dullness. Also the cardiac dullness reaches the nipple line: so that all three normal limits were exceeded and the heart is dilated slightly but definitely. The man complained of cardiac symptoms.

The following are examples of the measurements in ten cases of slight cardiac dilatation taken from a large number examined. The men all had the slight cardiac symptoms mentioned in this article.

We may consider the cardiac dullness normal if it does not extend *more than* $3\frac{1}{2}$ *inches from mid-sternum.* If it extends a little more than that distance it may be normal or abnormal according to the chest measurements, as already described.

The following are three useful indications:—

Transverse diameter of left half of chest	Extent of normal cardiac dullness from mid-sternum *not more than*
$5\frac{1}{4}$ inches or under	$3\frac{1}{2}$ inches
$5\frac{1}{2}$,, ,,	$3\frac{2}{3}$,,
6 ,, ,,	4 ,,
Circumference of left half of chest at level of apex	**Extent of normal cardiac dullness from mid-sternum *under***
15 inches or under	$3\frac{1}{2}$ inches
$16\frac{1}{4}$,, ,,	$3\frac{3}{4}$,,
$17\frac{1}{2}$,, ,,	4 ,,

If a man complains of much shortness of breath on slight exertion, of palpitation or dizziness, of slight pain in the cardiac region and considers that his heart is affected, and if we find no signs of valvular disease and no striking or *well-marked* signs of cardiac dilatation, and no œdema of the feet or other indications of cardiac failure than those named in this article, and no indications of flatulence or dyspepsia, before dismissing the case as one of malingering or neurosis, a careful examination of the cardiac dullness is desirable.

Malingerers should not be exempted from military service, and the pensions of malingerers should not be continued, but we must remember that it is equally important that a man who has served his country well should not be dismissed as a malingerer or neurotic man and his pension cut off or unfairly reduced, if he is suffering from cardiac muscle affection or failure. The detection of cardiac dilatation is of value in helping us to decide between the two classes of cases.

If the cardiac dullness is not increased and the heart sounds are normal we cannot, of course, say that the heart is therefore normal and the man a malingerer. But if the cardiac dullness is definitely though only slightly increased we have a clear indication in favour of the opinion that his symptoms are due to cardiac affection and that the man is not merely

neurotic or a malingerer, and the practical importance of this slight increase of cardiac dullness may be demonstrated in a striking manner by the cardiac symptoms which occasionally occur in such cases. If the cardiac dullness is increased and the heart dilated the man will of course often improve by suitable treatment and slowly graduated exercises and training, and be able to continue his duties in course of time.

I have found the method of mapping out the cardiac dullness by direct percussion with the finger, or by coins, of much service; and the relation of the extent of the cardiac dullness to all of the three chest measurements described in this article is a most valuable indication in deciding if the heart is dilated.

Clinical and other Notes.

THE EARLY SYMPTOMS FOLLOWING INFECTION BY *SCHISTOSOMUM MANSONI.*

By Major F. Blois Lawton.
Australian Army Medical Corps.

In August and September, 1916, twenty-four cases were admitted to the Australian General Hospital in Cairo suffering from some or all of the following symptoms: Abdominal pain, enlarged and tender liver and spleen, pyrexia, bronchitis, urticaria and diarrhœa.

All the patients were Australians who had not travelled before enlistment. At first it was not clear what was the matter with these men and blood cultures were made and other investigations carried out with negative results, but the blood picture afforded the key. In every case a striking eosinophilia was present. This led to prolonged examination of the stools for parasites and resulted in the discovery of the lateral spined ova of *Schistosomum mansoni.* The ova were found ultimately in the stools of all. The ova were scarce at this stage of the disease as presumably the majority of the paired adult worms had not yet found a suitable home in the veins draining the rectum.

All of these patients had been in camp at Tel-el-Kebir during the three months preceding the onset of symptoms and it was there that the infection was apparently contracted. Near the rifle range used by the men in camp there is a fresh water canal, in which the water flows sluggishly and the infected men had either bathed or washed in that canal. Most of them had been fully immersed, having swum in the water, but one man had merely washed his hands and another had washed cooking utensils in it. In the last two the infection was quite as severe as in the others. Some of the patients had swum more than once. None of them had washed in any other fresh water in Egypt except the shower baths and water provided for ablution. Itchiness of the skin was observed by several on coming out of the water. None of them had used towels. None of the patients could remember having drunk the water.

Following are notes of three cases:—

Case 1.—Admitted August 18.

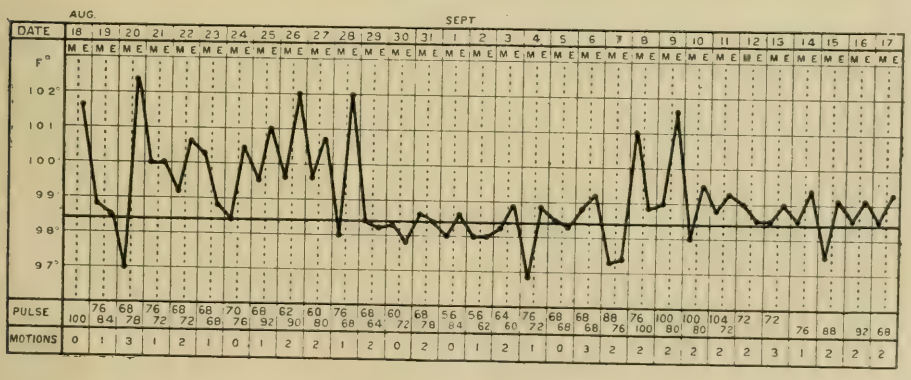
Past History.—Was overseer on a sheep station, New South Wales. Had had no sickness. Arrived in Egypt June, 1916. Bathed in fresh-water canal at Tel-el-Kebir about July 18.

Present Illness.—This began with a cough about a fortnight ago. He says that his sputum was stained with blood. At the same time he had headache and loss of appetite. These symptoms continued till four days ago, when he had sharp pains in the upper abdomen extending round the right side to his back. To-day the pain became general all over his abdomen. He had retching but no vomiting. His bowels were normal till two days ago, when he had diarrhœa, which continued till this morning. To-day there have been sweating and shivering.

On examination he looks sick and is flushed, and has a hot dry skin. Tongue

moist and slightly furred. Chest scattered rhonchi. There is a little mucoid sputum which is not blood stained. Abdomen: Distension and tenderness all over. Good movement. The maximum tenderness is in the right iliac fossa, and over the spleen and liver, which are enlarged and palpable. Urine normal. Blood culture was made on the night of admission. The result was negative. August 19: Leucocyte count, 20,000. August 20: Shiver. Blood film made and examined for malarial parasites. No parasites found, but high eosinophilia was revealed. August 21: Blood films made for differential white count. Result: Polymorphonuclears, 22·5 per cent; small mononuclears, 15·5 per cent; large mononuclears, 2·0 per cent; eosinophiles, 60·0 per cent. August 24: Urticaria on body and limbs. Present for seven days. Complaining of discomfort after food. August 29: Feels better; has no pain. August 31: Stool examined by pathologist. Large and small amœbæ of coli type and coli cysts and blastocystis and cysts were found. September 2: Stool again examined. Same result. September 6: Headache; slight shiver; abdominal pain. September 11: Shivered during night, complaining of headache, abdominal pain and fullness after food. Pain most severe and tenderness most marked in left lower abdomen. Has a little diarrhœa. Stool again examined and lateral-spined bilharzia ova were found. September 13: Abdominal pain during night. Discomfort after food this morning. September 20: Has improved, but abdominal pain and discomfort after food are still present. Liver and spleen are enlarged and easily palpable. September 23: Discharged to Australia as cot case.

CHART 1.



Case 2.—Admitted August 28.

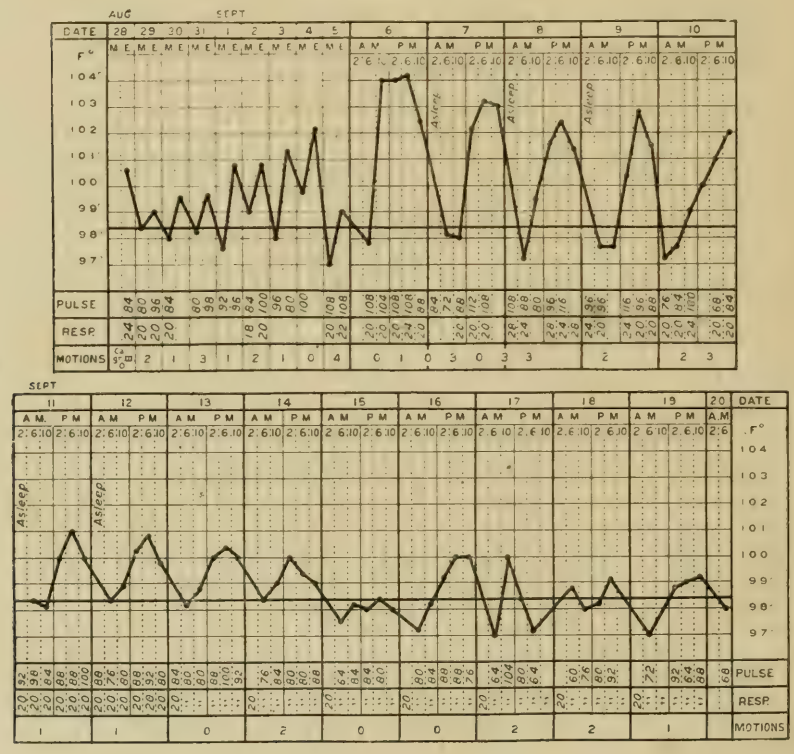
Past History.—Fitter in an iron foundry in Western Australia. No illness before enlistment. At Gallipoli three months. Sent off with dysentery and was in hospital in England three months. Returned to Egypt February, 1916. Swam in Canal at Tel-el-Kebir at end of May and beginning of June.

Present Illness.—Illness began on August 12, when he felt hot and giddy and had headache and pain across the lower abdomen; he had shivers and night sweats. There was no cough and no vomiting. He was constipated. Micturition normal. He was sent to a field ambulance and was transferred thence to a stationary hospital where he remained for about a fortnight before going to Cairo.

On admission.—Does not look sick and is lying comfortably on his back. Tongue

moist and slightly furred ; chest normal. Abdomen—Good movement, no distension. Tenderness in right iliac fossa and enlargement and tenderness of liver and spleen. August 30 : Urticaria present for two days. September 1 : Leucocyte count 17,000. Differential white count : Polymorphonuclears 16 per cent, small mononuclears 25·5 per cent, large mononuclears 3·5 per cent, eosinophiles 55·5 per cent. September 5 : Diarrhœa. Stool examined by pathologist. Report—stool liquid, no mucus or blood. Heavy lamblia cyst infection. No other parasites found. September 6 : Severe pain in upper abdomen ; tender over upper part of right rectus which is rigid. September 9 : Stool examined, same report as on the 5th. September 11 : Stool examined, lateral-spined bilharzia ova present. September 20 : Improved, but still has attacks of severe abdominal pain, and much discomfort after food. Liver and spleen enlarged. He is very wasted. September 23: Discharged to Australia as cot case.

Chart 2.



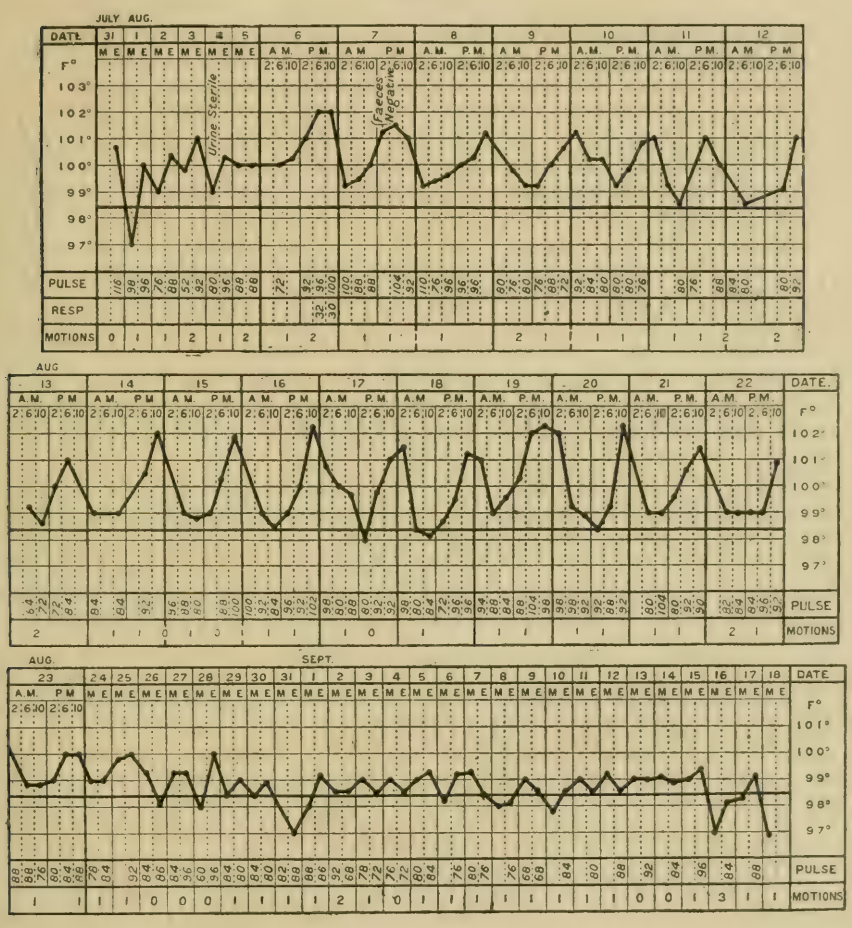
Case 3.—Admitted August 25.

Past History.—Farmer, Victoria. No illness before enlistment. Had measles in camp in Australia and recovered completely. Egypt February, 1916. Influenza March, 1916, good recovery. Swam in fresh water canal at Tel-el-Kebir at the end of May.

Present Illness.—At the onset at the end of June he had headache and dizziness

and felt weak. He reported sick on July 9 with these symptoms, pains all over and feverishness. He was sent to a Stationary Hospital and remained there for three weeks, during which time he had headache and pyrexia. In hospital he developed a cough. He was thought to have an enterica infection and was sent to an infectious diseases hospital on July 31. There the same symptoms continued. The cough became worse and was very troublesome at night and he had night sweats. Blood examinations for enterica were negative. His urine

CHART 3.



was sterile and fæces negative for organisms of the enterica group. August 18 : Leucocytes 18,000. August 20 : Sputum negative for tubercle bacilli. August 25 : Transferred to No. 3 Australian General Hospital. Examination—Looks sick, is pale and wasted, tongue moist, white fur in centre, teeth very bad, severe pyorrhœa ; signs of bronchitis in chest ; liver not felt but dullness extends to the fourth rib in the nipple line ; spleen palpable ; he states that he had a rash about a fortnight after the onset ; urine normal. August 26 : Differential white

count, polymorphonuclears 15 per cent, small mononuclears 14 per cent, large mononuclears 3 per cent, eosinophiles 68 per cent. August 29: Stool examined. Report—liquid stool, blood and mucus present; trichomonas and lamblia cysts present; no amœbæ or cysts seen. Many Charcot's crystals. August 31: Stool examined, similar results. September 7: Stool examined, similar results. September 10: Stool examined, similar results. September 11: Stool examined, lateral-spined ova of bilharzia present and living miricidium seen. September 20: From August 29 there was considerable improvement; but the cough continued to be very troublesome, especially at night, and caused loss of sleep. There was sometimes abdominal pain and discomfort after food, and his bowels were often loose; he had frequent night sweats; he was discharged to Australia as cot case on September 23.

Incubation Period.

The period of incubation was not as a rule easy to fix accurately, for the date of exposure to infection often could not be given definitely and, when the symptoms had appeared, some weeks before the patients were transferred to the base, the exact time of their onset was, in some instances, unknown. The shortest incubation period was four weeks, and the longest was about three months. Most often it was between four and eight weeks. This is shorter than the incubation period in vesical bilharziosis and none of the patients had signs or symptoms of that condition and ova were not found in their urine. But it is possible that symptoms of vesical bilharziosis may have become manifest later, for both types of bilharzia exist in the water where the rectal disease was acquired, for a patient who swam in the same water was admitted to No. 14 Australian General Hospital with vesical bilharziosis.

Symptoms (General).—Onset. This was sometimes abrupt, but more often the patients felt out of sorts for a few days, with loss of appetite, persistent headache, pains in the back and limbs and dizziness. There was usually a cough in the early stages. Sometimes cough was the first symptom. Vomiting was uncommon. These symptoms were followed by abdominal pain, which was often accompanied by diarrhœa. At the onset the pain was usually in the lower abdomen, but in a few cases pain in the upper abdomen was first noticed and later in the illness the most troublesome pain was in the right upper abdomen. During the first weeks of illness, there was pyrexia with hot dry skin and dirty tongue.

In some instances, however, the illness appeared to have been mild from the beginning. The temperature was remittent with an evening rise to 102° F. or 103° F. The temperature remained high for about ten days and then descended and sometimes it did not rise again above 99° F. or 100° F., but in other cases after seven to ten days another pyrexial period ensued. In a few cases the period of pyrexia extended over several weeks, the longest being about eight weeks. Shivers and sweats were frequent. The latter generally occurred at night and were sometimes severe. Headache was usually a troublesome symptom. Notwithstanding the temperature, the pulse was slow. Dicrotism was observed once. Later there was invariably an evening rise to 99° F. or 100° F. either daily or at intervals of two to three days, as long as the patient was under observation.

Urticaria.—Urticaria was always present at some stage of the disease and in patients who were seen soon after the onset it appeared in the second or third week. Its duration was variable, being from twelve to forty-eight hours as a rule, but in some cases it remained for seven or eight days. Its distribution was general, large wheals being scattered over the body and limbs. Often it had come and gone before the patients were sent to the base. In one case the urticaria recurred several times.

Blood Changes.—The red corpuscles were counted and hæmoglobin estimated in only two cases and these showed no changes. There was always a leucocytosis. It varied from 13,000 to 22,000 and was usually about 18,000. Differential white cell counts invariably gave a high eosinophilia. This was never lower than thirty-six per cent and was most often about fifty per cent. The highest was seventy-six per cent.

In cases of bilharzia hæmatobium previously reported the eosinophilia was generally lower.

Coles [1] found twenty per cent and Balfour [2] fourteen to eighteen per cent.

Douglas and Hand [3] in fifty cases found the eosinophilia was less than 5 per cent in 1 case, less than 10 per cent in 13, less than 15 per cent in 12, less than 20 per cent in 11, less than 30 per cent in 10 and greater than 30 per cent in 3.

Kautsky bey [4] reported no leucocytosis, and red cells not diminished and hæmoglobin 50 to 80 per cent. In 22 cases the eosinophilia was in 5 cases 5 to 10 per cent, 12 cases 10 to 20 per cent, 2 cases 20 to 30 per cent, 2 cases 40 per cent, and in 1 case 53 per cent.

Catouillard and Gober [5] described the following blood picture: Red corpuscles 3 to 5 million, white corpuscles 8,525 to 10,850, eosinophiles 5 to 26 per cent.

Nathan Laxrier [6] estimated the eosinophiles to be from 5 to 25 per cent.

Zweifel [7] gave the blood picture as: Red corpuscles 2,700,000 to 7,780,000, white corpuscles 4,500 to 17,500, eosinophiles 3 to 35 per cent.

Symptoms, Abdominal.—The abdomen was often distended. At first it was tender all over, but the maximum tenderness was over the descending colon and in the right upper quadrant and in the latter area the muscles were held on guard. The tenderness was very marked in the beginning but gradually diminished. It never entirely disappeared, some tenderness over the descending colon and over the liver remaining. The liver and spleen were enlarged, easily palpable and tender. Enlargement of those organs was found without exception in the first weeks, but though the liver continued to be palpable the spleen after three or four weeks could not in many cases be felt. Attacks of pain in the upper abdomen were frequent and often severe but the most distressing symptom was a feeling of fullness in the epigastrium after taking any nourishment. This was a constant and persistent symptom, and was the cause of much discomfort. Attacks of diarrhœa occurred but were not very common and not severe and rarely were present for more than twenty-four hours. During such attacks blood and mucus were often passed. With the diarrhœa tenesmus sometimes occurred but gave little trouble.

Diarrhœa, however, was in a few cases the outstanding feature of the illness and continued for from two to three weeks. When this was so, blood and mucus

were abundant in the stools and tenesmus was marked. In the absence of diarrhœa, or when the diarrhœa was present only for a few days, and had passed off, a little blood and mucus often insufficient to attract the patient's attention was the only abnormality seen in the stool. Often the stool appeared to be normal. In every case the stool sooner or later contained the lateral-spined ova of *Schistosomum mansoni*. Usually the ova were found at this stage of the disease only after prolonged search. Sometimes they were more readily found in mucus removed from the rectum.

Pulmonary.—Cough was sometimes the most prominent symptom and in a few instances it was present during the whole of the patient's stay in hospital. In the chest there were signs of bronchitis and in some cases there were also patches of consolidation. These signs usually cleared up fairly quickly, but in one case they were present for more than ten weeks, and were still present when the patient was discharged from hospital. Generally, the chest symptoms did not cause great inconvenience, but in some patients the cough was worse at night and resulted in loss of sleep.

Course of the Disease.—In most of the cases observed the tendency was for the symptoms to moderate after a varying time in which the patients were acutely ill. When the earlier stages were severe and the pyrexial period protracted there was considerable emaciation and weakness. Though the symptoms moderated, in no case did they clear up completely. All the patients remained weak, but improved a little and their weight increased. They were troubled by frequent headaches, occasional attacks of abdominal pain and diarrhœa and the feeling of fullness after food. Sometimes the condition of the bowels was normal and sometimes there was constipation. In some cases the acute stage had been passed before the patients reached the base and they were in this chronic condition when first seen.

Parallelism with Katayama Disease.—The early symptoms in these cases of rectal bilharziosis resembled, in a general way, those described in katayama disease, and the symptoms and course of the illness in some of these cases were very similar to those in cases of katayama disease reported by Bassett-Smith [8] and Edgar [9]. Though resembling it in a general way, the illness was less severe than that described in the katayama disease, for there was no ascites or œdema of the legs and there were no deaths.

A search of the literature showed an absence of any record of these early symptoms in infection by *S. mansoni*. All state that the first symptoms are those occasioned by the presence of the worm in the mucous membrane of the intestine Sandwith [10] in 1905 stated that "no symptoms are known to show when liver and lungs are affected."

The only observation indicating any recognition of an earlier febrile state set up by the development of the embryo in the liver is a note by Archibald [11], who described three cases of pyrexia of unknown origin which, at post-mortem, were found to have intestinal schistosomiasis. He emphasizes the fact that in these cases there was no eosinophilia.

Differential Diagnosis.

No. 1, Dysentery.—When the illness began with diarrhœa accompanied by the passage of blood and mucus and by abdominal pains and tenesmus, there

was a close resemblance to dysentery. In such cases dysentery was excluded by examinations of the stools for protozoa and bacilli.

No. 2, *Enterica.*—The early symptoms sometimes were suggestive of an enterica infection. This was always excluded on further investigation.

No. 3, *Urticaria.*—In some cases men first reported sick with urticaria, and when they were not very ill the condition was regarded as the result of some intestinal toxæmia and they were not sent to hospital till other symptoms appeared. In a few cases the first symptoms to attract attention were painful swellings of the eyelids and lips, and on the limbs, and in the absence of other symptoms a diagnosis of angioneurotic œdema was made.

No. 4, *Pulmonary Tuberculosis.*—When cough was the most prominent symptom and there were also wasting, evening rise of temperature and night sweats, and signs of bronchitis and consolidation, pulmonary tuberculosis was diagnosed. Several patients were admitted to hospital with this diagnosis and repeated examinations were made of the sputum for tubercle bacilli, but none were found.

No. 5, *Hepatic Abscess.*—In two cases this condition was thought to be present. In the first the liver was explored with a large needle, and pus was not found. This man had a history of dysentery a few months previously. The second man came in after a diagnosis of bilharziosis had been made in a number of other cases. A blood film showed an eosinophilia and bilharzia ova were found in his stools.

No. 6, *Ulcerative Endocarditis.*—One man presented a clinical picture very suggestive of this condition. Two blood cultures were made and both were negative. A blood film showed a high eosinophilia.

I wish to thank Colonel B. J. Newmarch, C.M.G., V.D., Commanding Officer of No. 3 Australian General Hospital, for permission to publish these notes. To Lieutenant-Colonel C. J. Martin, Pathologist to the Hospital, I am deeply grateful for much help. My thanks are due also to his assistants in the laboratory, Captain Kellaway and Sister Williams, and to my colleagues on the medical staff, under whose care many of these cases were, for opportunities of studying their cases.

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[1] Coles. *Brit. Med. Journ.*, 1902, p. 1137.
[2] Balfour. *Lancet*, 1903, vol. ii, p. 1649.
[3] Douglas and Hands. *Lancet*, 1903.
[4] Kautsky bey. *1er Congrès égyptienne dè Médecine*, Cairo, 1905, vol. ii, p. 61.
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[6] Nathan Laxrier. Quoted in an article on Bilharziosis, by Mathias Noc and Léger in Grall and Clarac, "Traité pratique de Pathologie exotique clinique et thérapeutique, 1913."
[7] Zweifel. *Arch. f. Schiff. u. Tropen Hygiene*, 1911, p. 73.
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[9] Edgar. *Journ. State Med.*, September, 1913, vol. xxi, No. 9, p. 542.
[10] Sandwith. "The Medical Diseases of Egypt," 1905, part i, p. 225.
[11] Archibald. *Brit. Med. Journ.*, 1914, vol. ii, p. 297.

ON THE INCUBATION PERIOD OF MUMPS (INFECTIOUS PAROTITIS).

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Although there is considerable literature dealing with the clinical complications of infectious parotitis, and its general epidemiological features have been summarized in Hirsch's classical treatise,[1] comparatively few data are available respecting the incubation period of the disease. The explanation is no doubt to be found in the habitually mild course of the disease in comparison with that of most of the zymotics, which deprives mumps of much practical importance in civil life. From the point of view of the army medical officer, mumps may, however, readily become a real source of inconvenience, and I have thought it desirable to place on record some observations I have had the opportunity of making.

The most extensive collection hitherto published is that of the Clinical Society of London,[2] contained in the report of their committee on incubation periods. Twelve cases are recorded in which there was but a single exposure to infection. The average interval between exposure to infection and the occurrence of pathognomonic signs was 20·9 days. In two instances the date upon which the patient became indisposed, prior to swelling of the parotid, is given, and was eleven days in one and eighteen days in the other. A further series of ninety-two cases is provided showing the date of onset counting from the last exposure. Here the mean interval works out to 18·5 days. There is no necessary discrepancy between these two averages since the latter series can only furnish the minimum incubation period, the length of the exposure prior to the date from which the interval is reckoned not being recorded. Clement Dukes[3] quotes a series of ninety cases, in sixty-nine of which a definite exposure was ascertained. The average incubation period in this series was between eighteen and nineteen days, with a minimum of thirteen and a maximum of twenty-five days. Hudelo[4] cites (without references) Rendu as an authority for placing the incubation period between eighteen and twenty days; he also says that Roth found an incubation period of exactly eighteen days in three cases, and other physicians have observed so short an incubation period as eight and so long a one as thirty days.

Bettelheim[5] reported a short but interesting series. He was medical officer in charge of a battalion 560 strong, forming part of the Austrian Army of occupation of Herzgovina in 1882, and was stationed in the remote and isolated township of Ljubinje. Two cases of typical mumps occurred on June 14 and June 16 in an officer and a private forming part of a detachment occupying a still

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[1] Hirsch's "Handbook of Geographical and Historical Pathology," English Translation, vol. iii, p. 277.

[2] *Clinical Society's Transactions*, vol. xxv, 1892 Supplement, p. 107.

[3] *Lancet*, 1881, p. 743; 1899, p. 1147.

[4] L. Hudelo, "Les Oreillons," Brouardel and Gilbert's *Nouveau Traité de Médecine*, Paris, 1905, fascicule ix, p. 81.

[5] *Weiner Med. Wochenschr.*, 1883, p. 1220.

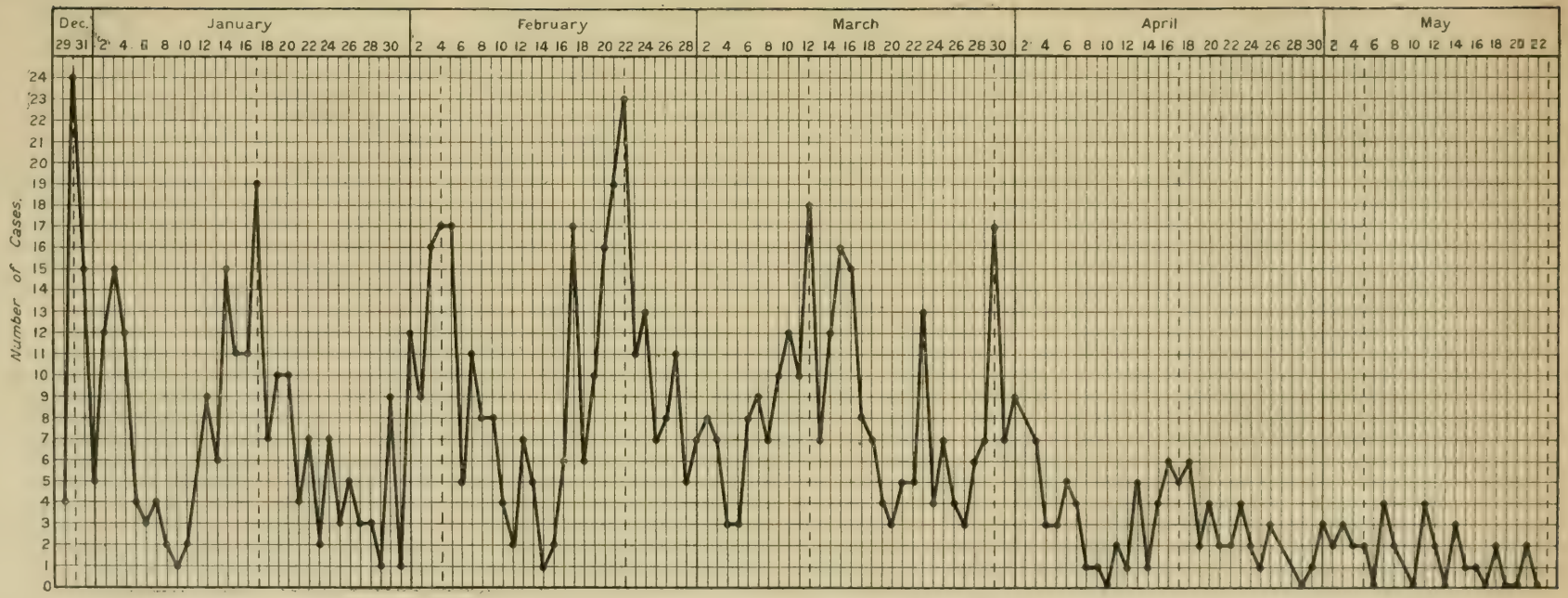

Chart showing number of cases of mumps occurring daily.

more isolated situation. After the detachment had been relieved and returned to Ljubinje two more soldiers of the same unit developed mumps on July 8 and July 9. No further cases occurred. These results suggest an incubation period of about twenty days. Bloomfield[6] has reported a case of mumps developing twenty-five days after a solitary exposure, while Penny[7] has recorded a small epidemic at Marlborough School. The first case was on May 6, a week after the term began; the next case was on June 1, there was another on June 3, and ten more between June 18 and 27. These are the only dated records I have found, the figures quoted in current text-books being for the most part derived from the Clinical Society's statement. It appears then that the limits are between eight and thirty days or rather more, observations clustering around the eighteenth to twentieth days.

My own observations relate to a camp in Surrey occupied by a mobilized division of approximately 18,000 men. Prior to December 29, 1916, there had been a few sporadic cases of mumps, but never more than one or two on any one day. On December 29 two battalions which had been exposed to mumps arrived in camp, and within thirty-six hours twenty-eight cases of mumps were admitted to hospital from these battalions. The epidemic, therefore, in so far as this camp was concerned, had a definite beginning on December 30, when twenty-four cases occurred. It lasted until the following May, during which time 902 cases occurred.

The course of the epidemic is illustrated graphically in the accompanying diagram. In addition, at the suggestion of Major Greenwood the daily returns are given in the accompanying table.

Both from the diagram and the table it will be seen that the maxima recurred with remarkable regularity at intervals of eighteen days. While the maxima are repeated at regular intervals (that there were actually as many cases on February 5 as on February 4 may be explained by the circumstance that the latter date fell upon a Sunday with the result that many cases were concealed until the following day) there is not a complete correspondence between intermediate returns for days occupying corresponding positions in the cycle. For example, for the cases occurring on May 15, 16, and 23 there is not a corresponding number of cases occurring eighteen days previously or eighteen days later. This might be due to two things: (1) The epidemic might be strictly periodic, an eighteen days' cycle being one component, but other components might also be present; (2) the eighteen days' cycle might be the only harmonic component, irregularities being due to accidental extraneous circumstances.

To test the former hypothesis I have utilized the method of the periodogram,[8] which has been recently employed with success by Brownlee[9] in the elucidation of epidemic diseases. It is known that when a series of numbers which are really periodic is written down in rows and columns the difference between the greatest and least of the columns summed vertically will be the largest when the number

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[6] *Brit. Med. Journ.*, 1905, i, p. 412.

[7] *Ibid.*, 1904, i, p. 489.

[8] See Carse and Shearer's "Course in Fourier's Analysis and Periodogram Analysis," Edinburgh Mathematical Tracts, London, Bell, 1915.

[9] *Public Health*, vol. xxviii, 1915, p. 125.

of items in each row corresponds to the period. Thus if the period is of six terms and we write down the observations in rows of six, the seventh observation being vertically below the first, and so on, the difference between the greatest and least of the vertical sums will be larger than when the process is with either five or seven items in each row. By summing the observations in rows of five, seven, etc., it is possible to isolate particular periodic constituents from data containing more than one. If for instance the series contains a period of 6 and also one of 11, the oscillation (i.e., the difference between the largest and smallest vertical sum) will decrease as we pass away from 6 and increase again as we approach 11 items to the row.

Succession of Cases.

Date	Number of cases	Date	Number of cases	Date	Number of cases	Date	Number of cases
Dec. 29	4	Feb. 3	16	March 11	10	April 16	6
,, 30	24	,, 4	17	,, 12	18	,, 17	5
,, 31	15	,, 5	17	,, 13	7	,, 18	6
Jan. 1	5	,, 6	5	,, 14	12	,, 19	2
,, 2	12	,, 7	11	,, 15	16	,, 20	4
,, 3	15	,, 8	8	,, 16	15	,, 21	2
,, 4	12	,, 9	8	,, 17	8	,, 22	2
,, 5	4	,, 10	4	,, 18	7	,, 23	4
,, 6	3	,, 11	2	,, 19	4	,, 24	2
,, 7	4	,, 12	7	,, 20	3	,, 25	1
,, 8	2	,, 13	5	,, 21	5	,, 26	3
,, 9	1	,, 14	1	,, 22	5	,, 27	2
,, 10	2	,, 15	2	,, 23	13	,, 28	1
,, 11	6	,, 16	6	,, 24	4	,, 29	0
,, 12	9	,, 17	17	,, 25	7	,, 30	1
,, 13	6	,, 18	6	,, 26	4	May 1	3
,, 14	15	,, 19	10	,, 27	3	,, 2	2
,, 15	11	,, 20	16	,, 28	6	,, 3	3
,, 16	11	,, 21	19	,, 29	7	,, 4	2
,, 17	19	,, 22	23	,, 30	17	,, 5	2
,, 18	7	,, 23	11	,, 31	7	,, 6	0
,, 19	10	,, 24	13	April 1	9	,, 7	4
,, 20	10	,, 25	7	,, 2	8	,, 8	2
,, 21	4	,, 26	8	,, 3	7	,, 9	1
,, 22	7	,, 27	11	,, 4	3	,, 10	0
,, 23	2	,, 28	5	,, 5	3	,, 11	4
,, 24	7	March 1	7	,, 6	5	,, 12	2
,, 25	3	,, 2	8	,, 7	4	,, 13	0
,, 26	5	,, 3	7	,, 8	1	,, 14	3
,, 27	3	,, 4	3	,, 9	1	,, 15	1
,, 28	3	,, 5	3	,, 10	0	,, 16	1
,, 29	1	,, 6	8	,, 11	2	,, 17	0
,, 30	9	,, 7	9	,, 12	1	,, 18	2
,, 31	1	,, 8	7	,, 13	5	,, 19	0
Feb. 1	12	,, 9	10	,, 14	1	,, 20	0
,, 2	9	,, 10	12	,, 15	4	,, 21	2

Illustrating this on the present data, we have for the oscillation when the horizontal row consists of 18 items, 108. The distribution about the maximum is roughly symmetrical. Thus the maximum is 125, the sum of the columns on either side of it 75 and 70, the next two corresponding sums are 60 and 63, etc. If the horizontal row consists of 19 or 17 terms, the oscillation sinks to 61 or 56.

A search has been made in this way for other periods. There is a slight suggestion of a period of between twelve and thirteen days, the oscillation

decreasing sharply from thirteen to fourteen horizontal items; this might possibly correspond to the type of short incubations mentioned in the literature, but the series, although a long one, is hardly long enough for the isolation of periods by the summation method to be quite satisfactory unless the change of oscillation is much more considerable than has been found to be the case. A second process which is readily applicable to astronomical data, for which the periodogram method is largely used—viz., subtraction of the ascertained periodic constituent (here the eighteen days' period) from the series in order to see how far the observations are reproduced—i.e., how little remains unaccounted for—fails because the epidemic is evidently declining in intensity, so that a simple *sine* series could not be used.[10] I am not confident, therefore, that any other period than the one of eighteen days exists.

Reverting to the second suggestion of external disturbing factors, it is to be noted that during the last week in February the disease was introduced for the first time into a very susceptible rural battalion with the result that an exceedingly large number of cases developed eighteen days later, all the susceptible men in the battalion apparently contracting the disease as the result of contact with the first cases to appear. There were other disturbing elements such as susceptible men being brought into the area from time to time, and also concealment of the disease during week ends and holidays.

The chief point brought out is the existence of an eighteen days' cycle as a chief component of the epidemic. Assuming this to represent a phase of the life cycle of the causative organism, it is seen to be maintained through several generations.

I wish to thank Major M. Greenwood, R.A.M.C., for the interest he has taken in this note, and for his valuable assistance in looking up the literature and affording me several references.

A CASE OF REMOVAL OF A RIFLE BULLET FROM THE RIGHT VENTRICLE OF THE HEART.

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AND
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Army Medical Service.

Trpr. M., aged 21, was wounded by a bullet on November 14, 1917. He rode some miles to the nearest dressing station and then collapsed. On examination it was found that the bullet had passed through the upper part of the right arm behind the humerus, and then entered the right chest between the fourth and

[10] The decline of the epidemic might be thought to support the belief that cold and changeable weather is a factor of epidemic prevalence, a view countenanced by the father of medicine, Hippocrates, who described undoubted mumps as epidemic in Thasos at the beginning of spring ("Epidemics," Book I, Chap. I), and partly by Hirsch (*op. cit.*, p. 281). I could trace, however, no connection between the weather and the course of the epidemic, while summer outbreaks have often been recorded (e.g., by Calmette, *Arch. de Gen. Medecine*, 1883, p. 455, in troops at Brest between May, 1877, and April, 1878).

FIG. 1.—Radiogram of position of bullet.

To illustrate "A Case of Removal of a Rifle Bullet from the Right Ventricle of the Heart," by Dr. MARGUERITE WHITE and Colonel Sir CHARLES BALLANCE, K.C.M.G., A.M.S.

fifth ribs and had not emerged. A radiogram taken the next day showed the bullet two inches from the surface in the cardiac region on a level with the inferior border of the heart; the bullet moved with the cardiac pulsations. It was thought to be in the wall of the left ventricle near the anterior margin. There was some fluid at the base of the right pleura.

November 16, 1917.—*Operation* at the 40th Casualty Clearing Station Hospital, Salonika. Transverse incision through upper part of left rectus and exploration of under surface of diaphragm. Nothing abnormal found.

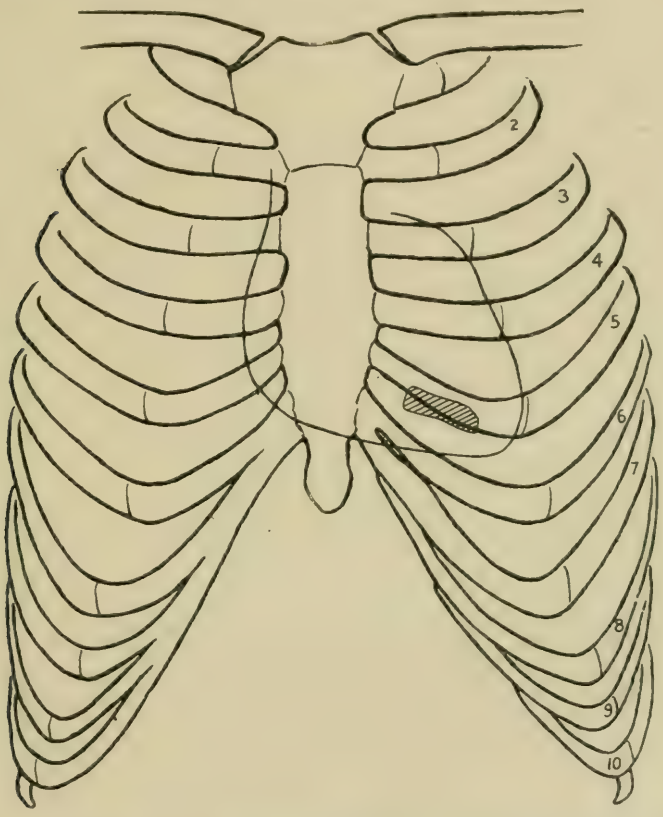


FIG. 2.—Diagram by Captain Crowe, R.A.M.C., of the position of the bullet from X-ray examinations.

Patient was transferred to 63rd General Hospital, Salonika. The abdominal wound was then suppurating. Examination of chest. No pericardial rub. No definite cardiac murmur, small amount of fluid at base of right chest. Left lung normal. X-ray examination confirmed previous report. Bullet still thought to be in left ventricle.

Patient admitted to St. Elmo Hospital, Malta, from Salonika on January 13, 1918, as a cot case.

On Admission.—General condition good. While lying down pulse 96 steady and regular: on exertion, such as getting out of bed or picking up an object off

the floor from the bed, the pulse became irregular and rapid. He was once allowed to cross the ward, when the pulse rose to 130 and the face became pale. The other clinical findings were all negative except for a small goitre which had been present for years. The patient came from Derbyshire. Repeated X-ray examinations, both with the screen and by means of stereoscopic plates were made, with the assistance of Major Campbell, R.A.M.C. (fig. 1). These showed movement of diaphragm independent of the bullet. The bullet lay behind the left fifth cartilage and left fifth intercostal space, $\frac{3}{4}$ inch from the left border of the sternum and about two inches deep from the skin surface in front. The base of the bullet lay towards the right while the pointed end was directed towards the left and somewhat downwards, and moved more than the base with the pulsations of the heart. It was thought that the base of the bullet was fixed in the wall of the right ventricle and that the pointed end was in the cavity of the right ventricle (fig. 2).

Decision to Operate.—The patient had suffered severely from sea-sickness during the voyage from Salonika and this had caused much distress from palpitation and choking sensations. Further, the rapidity and irregularity of the heart on the slightest exertion and the known position of the bullet made it desirable to perform an exploratory operation in order to determine whether it was possible to remove the bullet. The patient had remained in bed under observation without improvement.

Operation, February 16, 1918.—Lieutenant-Colonel Shirley gave the anæsthetic. Kocher's incision for exposure of the heart was made and the fourth, fifth and sixth costal cartilages of the left side were removed. The internal mammary artery was tied in two places and divided between the ligatures. The triangularis sterni was divided and the border of the left pleura crossing obliquely the front of the pericardium was seen and thereafter held aside with a copper retractor. No injury to the pleura occurred. The anterior surface of the pericardium appeared normal except for a small puckered scar $\frac{1}{2}$ inch from the left border of the sternum about the level of the fourth space. An incision was made in the pericardium passing obliquely downwards and towards the left and as long as the resection of the chest wall allowed. A very little gas and frothy fluid escaped but no adhesions between the parietal and visceral layer of the pericardium were found. The anterior surface of the heart appeared normal both to sight and touch. One of us (W.) then palpated the posterior surface of the heart and at once felt the bullet through the wall of the right ventricle near the apex. Five stitches of No. 1 silk were then passed close to the apex of the heart along the anterior inter-ventricular groove. Near the apex the groove was somewhat obscured by fat and the stitches passed through both muscle and fat. These threads were used to pull the apex of the heart forwards and upwards; a first-rate exposure of the posterior surface was thus obtained. On the posterior aspect of the heart no scar was visible and no bulging was seen. Palpation determined that the bullet was lying near the apex of the heart on the right side of the posterior inter-ventricular groove and was apparently in the ventricle. Four silk stitches were next inserted in the wall of the right ventricle along the line of the proposed incision; they passed twice through the muscle so that the loop could be drawn out of the way while the incision was being made. One of us (B.) then seized the heart with the left hand, using the thumb to compress the

right ventricle above the line of the proposed incision. It was found difficult to cut the quickly contracting heart muscle with the knife, so the incision into the ventricle was completed with scissors. B. then introduced a pair of artery forceps into the cavity of the right ventricle through the incision, seized the free extremity of the bullet and pulled it outside the heart. In doing so the inner surface of the ventricular wall was everted, exposing the columnæ carneæ, because the base of the bullet was firmly embedded and attached to this surface. W. then with a knife cut the inner aspect of the ventricular wall and the bullet was free. The hæmorrhage was fairly profuse but was at once controlled by

FIG. 3A.—Photograph of front view of parts removed at the autopsy. Below is seen the heart and pericardium. A portion of skin surrounding the wound has been left in situ. Above is seen the abscess cavity in the right lobe of the thyroid gland.

pulling on the stitches which had already been passed, and by putting in four more so as to invert, Lembert-like, the outer wall of the ventricle. The manipulation at no time affected the work of the heart, and the pulse only failed momentarily when blood was escaping from the heart. There was no visible sign of inflammation or sepsis. The pericardium was filled with saline and stitched up. The superficial incision was also closed and the patient returned to bed without shock. Colour good, respiration 20, pulse 110. Throughout the operation the blood-pressure was carefully noted.

Course of the Case.—For three days the condition was encouraging. On the fourth day some emphysema was noted on the upper part of the left side of the gladiolus and in the afternoon of that day there was serious collapse, from which the patient rallied after strychnia and oxygen had been given and mustard baths applied to the extremities. That night he was very restless, complained of pain in the chest, and had an irritating cough with choking sensations. Next day (February 21) while coughing, a large quantity of clear fluid of a yellow colour, and somewhat sticky and albuminous, escaped from the wound. He became unconscious and pulseless; strychnia and oxygen were again given, ether

FIG. 3B.—Photograph of front view of parts removed at autopsy. Same as fig. 3A, but enlarged, and not showing thyroid gland.

injected subcutaneously and mustard baths applied to the extremities. The patient revived, and in half an hour asked for his breakfast. Pulse 90, strong and regular. Breathing deep and easy, all pain gone. Profuse drainage from wound. On February 24 the discharge from the wound was definitely purulent, the skin flap was opened up, and the next day all stitches in the pericardium were removed, and the pericardial cavity, which contained pus, was irrigated with saline solution.

The subsequent history is that of progressive sepsis, with free discharge from the wound, and although the patient was carefully tended and was twice transfused, he died on March 14.

Autopsy.—Wide gaping wound in precordial region; large opening in pericardium; considerable area of anterior aspect of heart exposed. Petechial hæmorrhages subcutaneously and over some of the viscera. Liver, nutmeg mottling on sections. Spleen, somewhat enlarged. Kidneys, numerous minute abscesses and cloudy swelling of cortex. The thoracic viscera were taken away entire and preserved in ten per cent formalin for further examination. After

FIG. 4.—Posterior view of intrathoracic thyroid lobe, and above is seen the abscess cavity. Below the tissue is solid with some cysts of small size.

fixation: Both lungs normal. No enlarged glands in hilum of either lung or in mediastinum; the latter was normal. Œsophagus, trachea and main bronchi normal. The right lobe of the thyroid extended downwards some distance, indeed to the bifurcation of the trachea. This enlargement and extension downwards of the right lobe of the thyroid pressed the trachea towards the left, giving it a definite curve in that direction. At the back of the right lobe of the thyroid was a cyst $1\frac{1}{2}$ inches in diameter containing pus, below the cyst was more thyroid tissue which extended to the bifurcation of the trachea. The thoracic lobe was $2\frac{1}{2}$ inches long by $1\frac{1}{2}$ inches wide and was circular on horizontal section. On

section numerous cysts were seen, many of which contained pus. In parts the interstitial tissue contained calcareous matter.

The pericardium was opened from behind, it was lined by a thick adventitious membrane, the visceral layer was everywhere intact but thickened, and some petechial hæmorrhages were seen. The line of incision at the back of the right ventricle was not visible but two or three puckers on the surface of the heart gave some indication of the site of operation. The operation incision had to the

Fig. 5.—Posterior view of heart showing the healed line of incision. This is indicated by the projecting ends of some of the sutures.

naked eye apparently healed. Microscopic sections through site of incision in ventricular wall showed the line of incision occupied by young connective tissue and evidence of pus at the surface; other sections showed encapsulation of ligature and changes in the cardiac muscle near the incision.

Note by Professor S. G. Shattock, F.R.S., on the Microscopic Sections.

In the myocardium about the line of incision there is a well-pronounced formation of fibroblastic tissue which in some spots appear to have united certain of the muscular fasciculi, and in others not.

In the neighbourhood and in the line of the injury there is a somewhat widespread fibrino-purulent exudate containing several colonies of staphylococcus.

It may be observed that secondary hæmorrhage would have been likely to take place if the patient had lived longer, as the wound was so imperfectly healed and so acutely infected.

Remarks.—We have in the first place to express our thanks to Colonel Sir Archibald Garrod for the constant help he gave us in the management of the case. With regard to the course of the bullet the scar on the front of the pericardium and the fact that the bullet was deformed and must have been spent, make it probable that it passed forwards and downwards through the right chest, struck the back of the gladiolus and was thus deflected backwards through the pericardium and into the heart. We are publishing the case in full for the sake of those who, in the future, may have to operate on bullet wounds of the heart. Looking back upon the case we think it would have been pure luck if recovery had ensued and thus some other surgeon reading a glorified account of the case might have followed our methods and met with disaster. While the operation was carried out in many respects on the ordinary principles of surgery, treating the heart muscle like any other tissue of the body, the after-treatment was not in its early stages so conducted. When the patient became ill, instead of treating the case on ordinary principles and opening the lines of incision, we were absorbed in dreams and idle speculations, one of which was that clot was forming on the wound in the interior of the right ventricle and that its extension was embarrassing the action of the heart. It is a common experience that bullets frequently lodge in the tissues and induce neither local nor general infection until attempts at removal are made. The total absence of adhesions or any visible sign of inflammation in the pericardium and heart led us to close the wound in the pericardium, which was a fatal mistake. Further, on opening the pericardium we had observed a little gas and frothy fluid which notwithstanding all the other appearances must have been pathological, so that looking back we may affirm that there was no valid excuse for closing the pericardium. We were so little experienced in viewing large areas of the living heart that we had an instinctive desire to close the wound quickly and get it out of sight as soon as possible. As a matter of fact the pericardium and superficial wound should have been left widely open as if the operation had been done for suppurative pericarditis. The question of possible sepsis was ignored and further, in order not to leave any air in the pericardium, which might have caused surgical emphysema, it was filled to the brim with normal saline solution, and we believe that this must have embarrassed the heart and promoted sepsis, for though no absorption took place we are convinced that the amount of fluid was considerably increased by secretion. We do not know the normal amount of fluid in the pericardium in health, but we do know that it was a mistake to distend the pericardium with fluid, especially as we were in total ignorance of the absorbing power of the pericardium. We fancy that none of the fluid introduced was absorbed, and that being under pressure it was one of the prime factors in the early stages of the septic process. When the patient became ill on the fourth and fifth days and we were anxious about him, though the temperature was not above 99° F., there was no bulging forwards of the pericardium under the skin flap. This rather led the mind away from the pericardium to possible other causes of the condition. It was forgotten that the pericardium is an inelastic white fibrous membrane and could not possibly bulge forwards beyond its anatomical limits. The appearances during operation were so apparently normal that the bullet on removal was not, as it should have been, dropped into a culture medium. In the course of the case it appeared reasonable to assume that an abscess might form in the posterior mediastinum. The

lymphatics of the pericardium we believe go to the bronchial lymph glands, but we could not obtain a modern book of reference, such as Porier and Charpy, or Testut, on Anatomy. The Rector of the University, Professor Maqro, kindly gave us a cadaver to practise the operation of opening the posterior mediastinum. We

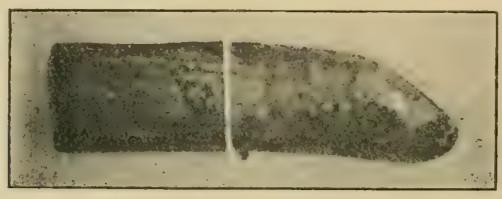
British, 175 grs. 1914. | German, 154 grs. 1914. M. | Turkish, 154 grs. 1915. M. | Turkish, 214 grs. 1912. M. | Italian, 154 grs. 1915. | Bulgar, 244 grs. 1903. M. | Bulgar, 212 grs. 1916. | Bulgar, 344 grs. M. 1903.

Serbian, copper, hollow, 36 grs., old pattern. | Serbian, 159 grs. 1915. M. | French, copper, 190 grs. 1914. | Lead, 520 grs. Picked up on field, Selonika. Nationality (?) | Greek, 174 grs. 1915. M.

The one marked with a cross was taken out of right ventricle of a man's heart at St. Elmo Hospital, Malta.

M. means magnetic.

Various types of bullets, showing which are and which are not magnetic.



Bullet (deformed and enlarged).

FIG. 6.

found that the removal of about two inches of the sixth and seventh ribs commencing two inches from the spines of the vertebræ enabled us to reflect the parietal pleura without injury or difficulty and to enter the mediastinum. In this body the posterior surface of the pericardium was five inches from the skin surface of the back.

Before operation we obtained bullets of different nations to see whether a magnet would be useful in removing the bullet from the patient. It was probable, indeed certain, that the bullet lodged in the patient was projected from a Bulgarian rifle as the only prisoners taken in the action in which this soldier was wounded were Bulgarians. The modern Bulgarian bullet tested by us was not magnetic, while the modern Serbian bullet proved strongly magnetic. We therefore did not have in the theatre the powerful electro-magnet made for us by the Royal Engineers. After removal the bullet proved to be an old Bulgarian bullet and was strongly magnetic (fig. 6).

Seeing that the patient had a goitre we ought to have studied this tumour by radiography before doing the heart operation. It would then have been discovered that there was an intra-thoracic lobe, and it might have been decided to remove this before operating on the heart. The cavity of this lobe might have been recognized, and the displacement of the trachea would certainly have been ascertained by an X-ray examination. The question also arises, was pus present in the thyroid before operation, and if not what is the lymphatic connexion between the pericardium and the thyroid gland?

It was impossible to drain the pericardium by placing the patient in the prone position as the heart then immediately blocked the exit from that cavity. At one time we thought that an abscess was forming in the posterior mediastinum, because of intermittent discharge of pus from the left side of the posterior part of the cavity; this portion being inaccessible to visual examination we could not judge what was going on there, as we could in all other regions of the pericardium. We, indeed, almost hoped that an empyema would form in the left pleura, because then it would have been possible to drain the empyema and at the same time to make an incision in the pericardium far back on the left side. We were familiar with a case of suppurative pericarditis in which this operation was done, and the patient recovered. But in this heart case no empyema occurred and no extension to the mediastinum; indeed, the thick strong wall of the pericardium could not easily or quickly give way to softening or perforation by the action of pus. We may mention that vaccines were used, but were of no avail. The use of a small soft rubber catheter with its point behind the heart, for continuous irrigation of the pericardium, caused no disturbance of the heart's action. In Kocher's operation the cartilages are divided at their inner extremities and displaced outwards with the flap. This seemed undesirable, and a less simple procedure than removal, hence in this case the cartilages were taken away. During the War several cases have been recorded of operations on the heart, in the *Daily Review of the Foreign Press*, and elsewhere. The difficulty of dealing with suppurative pericarditis is emphasized in the story of these cases. Other instances in which operation has been done are recorded, but the final result has not been stated. We think, therefore, that the publication of a fairly full account of this case may be useful to our fellow-workers.

Abstract of the Daily Notes of the Case.

February 16, 1918.—Operation.

February 17.—Patient vomited for twenty-four hours after the operation; somewhat restless; was given morphia and strophanthus; temperature 98·6° F.; pulse 110, good quality.

February 18.—No sickness; slept all night; very comfortable; pulse 120, rather high tension; temperature normal; heroin and strophanthus, two doses given during the day; taking nourishment well.

February 19.—Slept all night; pulse 138, soft, missing one every six beats; taking nourishment well; temperature normal.

February 20.—Slept well; pulse 128, missing one every third beat; respiration 24; colour good; patient apparently very well; doubtful extension of pericardial dullness to right; some emphysema on upper part of left side of gladiolus. 12 noon: Temperature 100° F.; pulse 120; breathing laboured and shallow; extremities cold; perspiring profusely; very thirsty. 3 p.m.: Temperature 98° F.; pain in left side of chest and very restless. 5 p.m.: Serious collapse; face and limbs cyanotic; no radial pulse; strychnia and oxygen given and mustard baths to the extremities. 7 p.m.: Patient much better; good colour; pulse 120; temperature 99° F.; respiration 38; heroin and strophanthus given.

February 21.—Very restless night; temperature 99° F.; pulse very feeble; breathing difficult; pain in left side of chest; irritating cough and choking sensations. 11 a.m.: While coughing a large quantity of clear fluid of a yellow colour and somewhat sticky and albuminous in character escaped from the wound; patient became unconscious and pulseless; strychnia, oxygen, ether subcutaneously, hot mustard baths to the extremities revived the patient; in half an hour patient asked for his breakfast; pulse 90, strong and regular; breathing deep and easy, all pain gone; profuse drainage from wound. 3 p.m.: Has slept three hours; is very comfortable; blood-pressure 120.

February 22.—Temperature 101° F.; pulse 90, good volume and regular; taking food well. Morphia ¼ grain given in evening.

February 23.—Wound draining considerable quantities of clear serous fluid; temperature 101° to 102° F.; eusol compresses; some of the superficial stitches removed.

February 24.—Temperature 102° F.; pulse 120; respiration 30 to 40 when awake, 24 when asleep. Some more stitches removed; fluid turbid, very free drainage. 7 p.m.: Some pus coming from wound; skin flap opened up, exposing a gangrenous cellulitis beneath; irrigation with eusol. There is no obvious opening in the pericardium—the incision seemed closed entirely; eusol pack to wound; this was frequently changed.

February 25.—9 a.m.: Temperature 100·8° F.; pulse 120, regular. There is now an opening in the pericardium; through this opening thin purulent fluid in pericardium was washed out by means of a catheter and eusol. 3 p.m.: All the pericardial stitches were removed, and the whole length of the line of incision in this membrane was opened and the cavity irrigated with saline solution. 9 p.m.: Temperature 101° F.; pulse 130, irregular; respiration 40, when asleep 26.

February 26.—Has had a very restless night, with pain in chest and feeling of faintness. Temperature 100·2° F.; pulse 112; respiration 34. 9 p.m.: Pulse irregular and rapid; has been given morphia and strophanthus. Pericardium washed out every eight hours by pouring a jugful of eusol slowly into the pericardium.

February 28.—Not so well; breathing shallow; complains of fullness in the chest; diarrhœa; pulse rapid and irregular; much pus coming from pericardium,

especially from left posterior region which could not come under observation like other parts of the cavity.

March 1.—9 a.m.: Left chest normal, right chest dull behind up to level of fifth rib. Temperature 104° F.; pulse 128; respiration 38. Query—Empyema on right side from continuity of infection from pericardium; right chest exploratory puncture, clear fluid removed which proved sterile. The examination of the pericardial pus showed the presence of *Streptococcus pyogenes*, *Staphylococcus aureus* and a *long thin bacillus* which was *gas producing* and which Major Russell could not identify. Blood films negative to malaria.

March 2.—Temperature 104° F.; pulse 128; breathing better; œdema of left foot; the pus from the pericardium is less in quantity and the question arose, was it escaping into the mediastinum?

March 3.—Patient's condition unchanged. Right chest aspirated, twelve ounces of clear fluid removed which proved sterile; temperature still 104° F.

March 4.—The temperature dropped to 101° F. in the evening, respiration 24; wound outside pericardium quite healthy; complains of bad taste in the mouth; dyspnœa, dysphagia, and pains on left side of chest.

March 5.—Leucocytes count 4,500; temperature during night dropped suddenly to 97° from 104° F.; patient much collapsed; much pus suddenly escaped from pericardium, probably a local collection behind the heart; incontinence of fæces and urine. 9 p.m.: Temperature 100° F.; pulse 120; taking food well; dyspnœa and dysphagia absent.

March 6.—In the effort to check the sepsis it was decided to do direct transfusion of blood. Major Russell had previously selected a donor whose blood was homologous to that of the patient; patient looks very anæmic and is very feeble; temperature 100° F.; pulse uncountable and irregular. While the donor's artery was being anæsthetized with eucaine he fainted, the blood-pressure fell to 90 and the transfusion of blood became impossible. The patient was then infused with Oii of normal saline to which was added ʒiiss of brandy and six cubic centimetres of a 1 in 1,000 perchloride of mercury solution.

March 7.—Very good night; pulse still irregular, volume better; taking nourishment well. 9 p.m.: Saline infusion repeated with ʒiii of brandy and seven cubic centimetres of 1 in 1,000 solution of perchloride of mercury. There is phlebitis of external saphenous vein of left leg.

March 8.—Urine shows for the *first time albumin*, casts and pus; autogenous vaccine given. General condition slightly improved. Temperature 100° F.; pulse 100.

March 9.—Temperature 102·6° F.; pulse 96, regular; sweating a good deal; taking food well. Large quantity of pus coming from pericardium, the amount of pus seems stationary; the cavity is still irrigated every eight hours with eusol.

March 10.—Patient very anæmic and weak; petechial cutaneous hæmorrhage at various places. Temperature 101° F.; pulse 120. Blood transfusion decided on; hæmoglobin, fifty-eight per cent; leucocyte count, 4,500. 8 p.m.: The transfusion apparatus of Bazett was employed. On dissecting out the radial artery of the donor it was found extraordinarily small—it was obvious that the radial artery had divided higher up the forearm. The operation was, however, continued; but the stream of blood from the small artery of the donor was

unsatisfactory, and it was thought that not more than 300 cubic centimetres had passed into the vein of the patient; nevertheless, the colour of the patient improved and the pulse dropped from 130 to 90.

March 11.—Leucocyte count, 12,700; hæmoglobin, sixty-eight per cent. Thus a marked improvement in the condition of the blood was effected by yesterday's transfusion. Patient very weak and feeble, but colour better. Temperature 99° to 101° F.; pulse varies from 90 to 120. Much pus from pericardium; continuous irrigation with eusol. Strychnine and digitalis every three hours; glucose ʒ v, brandy ʒ i, every four hours per rectum.

The patient's condition remained very grave till his death on March 14. Another transfusion of blood was carried out on March 12: a large quantity of blood passed from the donor to the patient; the operation was continued till the blood-pressure of the donor fell to 90. Blood was passing from the donor for 5½ minutes. The red count previous to the transfusion was 1,500,000. Major Russell estimated next day that two out of every three red blood corpuscles in the patient's blood had come from the donor. The last two days the temperature was normal or 99° F., and consciousness was present to the last.

Report.

AN INVESTIGATION INTO THE INCIDENCE OF ALBUMINURIA AND CASTS IN BRITISH SOLDIERS DURING TRAINING AND THE RELATIONSHIP OF THIS CONDITION TO WAR NEPHRITIS.

By Captain H. MacLEAN.
Royal Army Medical Corps.

Report to the Committee on War Nephritis.

(The Medical Research Committee provided the services of Captain H. MacLean.)

(*Concluded from p.* 426.)

TABLE LIII.—Incidence of Casts in Different Age Periods in Fourth Group of 10,000 Men Examined.

Age period	Number of men in each period	Number of men with casts in each period	Average per 1,000
19 to 23 years inclusive ..	3,789	80	21
24 ,, 28 ,, ,, ..	2,344	54	23
29 ,, 33 ,, ,, ..	1,672	34	20
34 ,, 38 ,, ,, ..	1,244	28	22
39 ,, 43 ,, ,, ..	883	14	16

TABLE LIV.—Relation of Age to Incidence of Albuminuria in Fifth Group of 10,000 Men Examined.

Age	Number of men of given age in group examined	Number of men of given age with albumin	Percentage of men with albumin at different ages
18	26	4	16·0
19	1,036	122	12·0
20	824	64	7·7
21	748	65	8·7
22	730	44	6·0
23	658	28	4·2
24	573	37	6·5
25	525	41	7·8
26	490	30	6·1
27	416	17	4·1
28	413	22	5·3
29	396	29	7·3
30	399	22	5·5
31	310	22	7·1
32	279	18	6·4
33	280	14	5·0
34	228	9	4·0
35	230	12	5·2
36	222	11	4·9
37	196	12	6·1
38	206	9	4·4
39	171	11	6·4
40	170	5	2·9
41	143	7	4·9
42	123	9	7·3
43	66	4	4·0
44	26	2	8 0
45	17	—	—
46 and over	52	2	4·0

TABLE LV.—Relation of Age to Well-marked Albuminuria (A, B, C, D Grades) in Fifth Group of 10,000 Men.

Age	Number of men in group	Number of men with well-marked albuminuria in group	Percentage of men with well-marked albuminuria in each group
18	26	2	6·0
19	1,036	71	6·8
20	824	28	3·4
21	748	37	4·9
22	730	20	2·7
23	658	14	2·1
24	573	15	2·6
25	525	21	4·1
26	490	21	4·3
27	416	10	2·4
28	413	11	2·6
29	396	18	4·5
30	399	7	1·8
31	310	11	3·5
32	279	6	2·1
33	280	8	2·9
34	228	4	1·8
35	230	3	1·3
36	222	4	1·8
37	196	7	3·5
38	206	4	1·9
39	171	6	3·5
40	170	—	—
41	143	3	2·1
42	123	6	4·8
43	66	2	3·0
44	26	1	3·9
45 and over	69	1	1·4

TABLE LVI.—Incidence of Total Albuminuria and of Well-marked Albuminuria (A, B, C, D Grades) in Fifth Group of 10,000 Men in Different Age Periods.

Age period	Number of men in each period	Total albuminuria		Well-marked albuminuria	
		Total number of men suffering from albuminuria of all grades in each period	Average per 1,000	Total number of men suffering from well-marked albuminuria (A, B, C, D grades) in each period	Average per 1,000
18 to 22 years inclusive	3,364	299	89	158	47
23 ,, 27 ,, ,,	2,662	153	57	81	30
28 ,, 32 ,, ,,	1,797	113	64	53	29
33 ,, 37 ,, ,,	1,156	58	50	26	23
38 ,, 42 ,, ,,	813	41	50	19	23
43 years and over ..	161	8	49	4	25

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TABLE LVII.—Relation of Age to Presence of Casts of all Kinds in Fifth Group of 10,000 Men Examined.

Age	Number of men of given age in each group	Number of men of given age with epithelial casts	Number of men of given age with hyaline casts	Total number of men of given age with casts	Percentage of men of given age with casts
19	1,036	7	29	36	3·5
20	824	6	9	15	1·8
21	748	3	17	20	2·7
22	730	7	9	16	2·2
23	658	1	8	9	1·4
24	573	6	8	14	2·4
25	525	3	9	12	2·3
26	490	4	6	10	2·0
27	416	1	2	3	0·7
28	413	—	8	8	1·9
29	396	3	5	8	2·0
30	399	—	6	6	1·5
31	310	2	7	9	2·9
32	279	2	5	7	2·5
33	280	1	2	3	1·1
34	228	1	1	2	0·9
35	230	—	3	3	1·3
36	222	2	1	3	1·3
37	196	4	1	5	2·5
38	206	2	4	6	2·9
39	171	4	1	5	2·9
40	170	2	2	4	2·3
41	143	—	2	2	1·4
42	123	2	3	5	4·0
43	66	—	1	1	1·5
44	26	—	1	1	3·8
45	17	—	—	—	—
46 and over	52	—	1	1	1·9

TABLE LVIII.—Incidence of Casts in Different Age Periods in Fifth Group of 10,000 Men Examined.

Age period	Number of men in each period	Number of men with casts in each period	Average per 1,000
19 to 23 years inclusive ..	3,996	96	24
24 to 29 ,, ,, ..	2,417	47	19
29 to 33 ,, ,, ..	1,664	33	19
34 to 38 ,, ,, ..	1,082	19	17
39 to 43 ,, ,, ..	673	17	25

(8) Results of Investigation on Recruits at Aldershot.

After the examination just described was completed at the base, the results obtained seemed sufficiently important to warrant an extension of the investigation to recruits. The purpose of this was to ascertain whether the same incidence of albuminuria existed among newly-joined recruits as was found in the trained soldier.

In order to accomplish this, arrangements were made to examine 10,000 recruits at Aldershot. On proceeding to Aldershot for this purpose, however, I found that it was quite impossible to get sufficient numbers of newly-joined

men, for the majority of the men at this base had already undergone several months' training, and were, indeed, in a general way, comparable with those already examined in France.

Under the circumstances, the original intention had in a measure to be abandoned, but a sufficient number of men was found to throw light on the problem of albuminuria in the recruit.

In all, 10,000 men were examined; the general result of the investigation was similar to that obtained in France.

The two special points considered in this investigation were the relation of albuminuria to (1) length of service and (2) age.

Out of the 10,000 men examined, 2,132 had less than one month's service; some of these had no service at all, while several had only one or two days. Several had a week or more, and a few had two to three weeks.

Of these, 2,132 men, 68 per 1,000 had albuminuria, while 34 per 1,000 had well-marked albuminuria; in 15 per 1,000 casts were found.

These figures agree well with the results obtained in the investigation of the three groups already described, amounting in all to nearly 30,000 men.

In these groups, as already stated, the incidence of albuminuria did not vary to any degree with length of training, and was, for men who had undergone from three to seven months' training, 69 per 1,000 for total albuminuria, 34 per 1,000 for well-marked albuminuria, and 24 per 1,000 for casts. Reference to Table XXVI shows that the figures for other service periods are more or less similar. At Aldershot corresponding figures were found for men who had from one to two months' training. (Table LIX.)

These results indicate that training does not apparently increase the incidence of albuminuria in recruits. This conclusion is in harmony with the general results of this investigation, and from it we may safely argue that the incidence and extent of albuminuria in the Army, as seen during training, is not appreciably greater than it is in civilians of corresponding ages.

As already stated, the incidence of albuminuria in young soldiers examined at Aldershot was found to be lower than that for the corresponding age group in France. The reason of this is not obvious, but may be dependent on the fact that sufficient numbers of men of given age were not available at Aldershot.

The Aldershot investigation, though restricted from lack of material, definitely shows, when considered in conjunction with the investigation in France, that Army life and conditions of service in general during training play no part in inducing kidney deficiency as indicated by the presence of albumin and casts in the urine. The results obtained are given in Tables LIX and LX.

TABLE LIX.—Incidence of Albuminuria and Casts in Recruits and in Men with Little Training.

Period of service	Number of men	Total with albuminuria	Average per 1,000	Total with well-marked albuminuria	Average per 1,000	Total with casts	Average per 1,000
Under 1 month	2,132	144	68	72	34	31	15
Between 1 and 2 months ..	1,361	83	61	31	23	16	12
Men examined in France, with 3 to 7 months	—	—	69	—	34	—	24

TABLE LX.—INCIDENCE OF ALBUMIN AND CASTS IN VERY YOUNG SOLDIERS.

Age	Number of men	Total with albuminuria	Average per 1,000	Total with well-marked albuminuria	Average per 1,000	Total with casts	Average per 1,000
18 to 19 years ..	5,837	392	67	178	30	70	12

(9) SUMMARY OF RESULTS OF INVESTIGATION.

(1) In 50,000 men who had practically completed their training, the incidence of total albuminuria of all kinds was found to be 6·48 per cent. After allowing for cases with pus, spermatozoa, etc., the general incidence came out at 5·62 per cent.

For well-marked albuminuria the numbers were 2·55 per cent for all kinds of albuminuria and 2·19 per cent after allowing for pus, etc.

Roughly speaking, the total incidence of albuminuria unaccounted for by the presence of spermatozoa, pus, and other substances, was about 5 per cent, while the corresponding figure for well-marked albuminuria was only about 2 per cent.

(2) Well-marked epithelial and various kinds of hyaline casts were present in certain urines. Very few blood casts were met with.

Out of the 50,000 men, the average number of urines found to contain casts was 1·87 per cent.; of these, 0·84 per cent had definite epithelial casts, while in 1·03 per cent hyaline casts were found.

(3) The total number of men who had albuminuria together with moderate or often large numbers of epithelial or hyaline casts was 550. Of these, 271 had epithelial casts, while in 278 the casts were of the hyaline variety.

It appears that the minimum number of men suffering from more or less definite kidney disease was 550. It is therefore probable that the "Active Service" part of the Army contains, during training, at least 1·1 per cent of men whose kidneys are inefficient, and who are suffering from some degree of disease.

As far as can be determined by examination of the urine, it can be stated with some confidence that not more than two per cent of men give any definite indication of kidney disease as indicated by the presence of albuminuria and fairly large numbers of casts. Definite signs of disease are found in about one per cent of men.

(4) The albuminuria which is produced by sudden severe exertion passes off on resting, and does not appear to become any more marked with prolonged training than it was at the beginning. There is no evidence that it tends to become chronic.

(5) No relationship between incidence of albuminuria and occupation was found in this inquiry. The number of men investigated from this point of view was only 10,000, and the number of different occupations was so great that no figures of statistical importance were available.

(6) Neither the incidence of albuminuria nor of casts has any tendency to increase as the result of long service. This observation appears to be of great importance in its possible bearing on war nephritis.

(7) As a general rule, the incidence of albuminuria is greater in young soldiers (from 18 to 22 or so) than it is in older men; after 25 it decreases somewhat, and

then remains more or less constant. Indeed, in soldiers over 40 there is a distinct tendency for it to decrease to an appreciable extent.

(8) The investigation at Aldershot gave similar results to those obtained at the base in France.

(9) The general results of this investigation strongly support the view that no injurious effects are produced on the kidney by any of the conditions associated with training for active service; the soldier during training does not appear to be more liable to deleterious kidney effects than is the civilian in ordinary life. From this it would appear that war nephritis is probably not the result of any condition present during training, but is due to some factor which is operative, chiefly, in the fighting area.

For assistance in carrying out this investigation I am indebted to so many people that it is impossible to mention them all by name. I wish, however, to take this opportunity to express my thanks to the commanding officers and adjutants of the local infantry base depots for their great kindness and help in making the necessary arrangements for examination of the men. In the later part of the investigation I was fortunate enough to have the assistance of Captain De Wesselow, without whose help it would have been hardly possible for me to complete the examination. I wish also to express my special thanks to two officers of the R.A.M.C.—Captain Wood and Major Dennis. Captain Wood was in charge of 46 Stationary Hospital, and did everything possible to assist me to get the necessary laboratory accommodation. Major (now Lieutenant-Colonel) Dennis, who was then Assistant Inspector of Drafts, spared no pains to render me all the assistance he could; indeed, I feel that no words of mine can express my indebtedness to this officer, whose help and encouragement at all times did much to make this investigation practicable.

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OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

DECEMBER, 1918.

EXTRACTS FROM THE "LONDON GAZETTE."

War Office,
November 9, 1918.

The following are among the Decorations and Medals awarded by the Allied Powers at various dates to the British Forces for Distinguished Services rendered during the course of the campaign :—

His Majesty the King has given unrestricted permission in all cases to wear the Decorations and Medals in question.

DECORATIONS CONFERRED BY HIS HIGHNESS THE SULTAN OF EGYPT.

Order of the Nile, Second Class.

Surg.-Gen. Sir James Maher, K.C.M.G., C.B.

Order of the Nile, Third Class.

Lieut.-Col. Hugh Wright Thomson, M.B., Royal Army Medical Corps.

DECORATIONS CONFERRED BY THE PRESIDENT OF THE PORTUGUESE REPUBLIC.

Red Cross Medal, Second Class.

Major (Temp. Lieut.-Col.) Horace George Pinches, Royal Army Medical Corps.

War Office,
November 13, 1918.

His Majesty the King has been graciously pleased to approve of the award of the Military Medal for Bravery in the Field to the undermentioned Non-commissioned Officers and Men :—

ROYAL ARMY MEDICAL CORPS.

352596 Serjt. W. F. Crow (Manchester).
35521 Serjt. F. Dodd (South Yardley).
388466 Cpl. C. W. R. Warren (Southwick, Sunderland).
35801 Pte. D. Anderson (Lochgelly).
43318 Pte. H. Branch (Mountain Ash).
339208 Pte. G. Breithaupt (Liverpool).
21119 Pte. E. Butterwick (Hull).
35764 Pte. W. Clapp (Tiverton).
401346 Pte. J. Daniels (Leeds).
47852 Pte. J. W. Dever (Oldham).
9012 Pte. R. H. Durbin (Oakenshaw, Durham).
41896 Pte. (Acting Serjt.) H. B. Hollyer (Droitwich).
43131 Pte. J. Hughes (Oldham).
36370 Pte. M. Ireland (Kelty).
6834 Pte. J. G. Jones (Rhyl).
401433 Pte. G. Ormsby (Leeds).
68570 Pte. W. C. Robinson (Douglas, Isle of Man).
68213 Pte. T. Scanlon (Wigan).
75561 Pte. S. Simpson (Leek, Staffs).
29327 Pte. A. L. Truslove (Smethwick).
87706 Pte. F. H. Warden (Leicester).

War Office,
November 15, 1918.

His Majesty the King has been graciously pleased to approve of the award of the Distinguished Conduct Medal to the undermentioned Non-commissioned Officers and Man for Gallantry and Distinguished Service in the Field :—

439013 Serjt. E. V. Cann, M.M., Royal Army Medical Corps (Bristol).

For conspicuous gallantry and devotion to duty during a raid. He was in charge of a relay post in the front line which was blown in, burying a chaplain. He immediately went to his rescue and dragged him into a dug-out, finally carrying him under shell fire to a relay post in the rear. He behaved splendidly.

48124 Serjt. T. G. Hopkins, M.M., Royal Army Medical Corps (Treorchy).

Heavy shelling had caused severe casualties among artillery men and transport on a road. In spite of the difficulty and great danger, he went to the aid of the wounded, extricated them from a tangle of kicking animals, and carried them to the comparative safety of shell holes. He carried four wounded men one after another on his back. On a later date he brought back many wounded from an area heavily swept by machine-gun fire. He was twice blown up by shells, but managed to reach the A.D.S. and notify where the wounded were collected before he collapsed. His gallantry and self-sacrificing devotion to duty were peculiarly admirable.

46942 Pte. M. O'Hara, Royal Army Medical Corps (Heywood).

For conspicuous gallantry and devotion to duty. When he and three other bearers were bringing a wounded man to the advanced dressing station a shell burst and wounded two of the bearers and killed the third. He at once carried the wounded men into shelter and then went under heavy fire and collected three more bearers and brought all wounded back to the advanced dressing station. He behaved splendidly.

War Office,
November 29, 1918.

The following are among the Decorations and Medals awarded by the Allied Powers at various dates to the British Forces for Distinguished Services rendered during the course of the campaign :—

His Majesty the King has given unrestricted permission in all cases to wear the Decorations and Medals in question.

DECORATIONS CONFERRED BY THE PRESIDENT OF THE FRENCH REPUBLIC.

LÉGION D'HONNEUR.

Croix de Guerre.

Major (Temp. Lieut.-Col.) Hugh Allan Davidson, D.S.O., M.B., Royal Army Medical Corps.

Major-Gen. James Barnett Wilson, C.B., C.M.G., M.D., Army Medical Service.

439130 Pte. Hugh Douglas Alexander Dun, 1 3rd (South Midland) Field Ambulance, Royal Army Medical Corps (Territorial Force) (Bristol).

439403 Pte. Thomas Victor Harris, 1/3rd (South Midland) Field Ambulance, Royal Army Medical Corps (Territorial Force) (Portishead).

M/288402 Pte. David McIlvenny, M.M., Army Service Corps, attached 1/3rd (South Midland) Field Ambulance, Royal Army Medical Corps (Territorial Force) (Belfast).

43035 Pte. (Acting Serjt.) David John James, M.M., 75th Field Ambulance, Royal Army Medical Corps (Tylorstown, Rhondda).

Correction.

With reference to the award of the Croix de Guerre to Captain Gideon Johannes Joubert, South African Medical Corps, published in the 5th Supplement to the *London Gazette* of August 20, 1918, the letters "M.C." after his name should be amended to read "M.B."

DECORATIONS AND MEDALS CONFERRED BY HIS MAJESTY THE KING OF ITALY.

Order of the Crown of Italy.

Cavalier.

Temp. Capt. John Harold Peek, M.D., Royal Army Medical Corps.

Officer.

Lieut.-Col. (Acting Col.) Henry Hewetson, D.S.O., Royal Army Medical Corps.

Bronze Medal for Military Valour.

Capt. (Acting Major) Albert Edward Peel McConnell, M.C., Royal Army Medical Corps (Territorial Force).

Croce di Guerra.

Temp. Capt. Andrew Findlay Readdie, Royal Army Medical Corps.

435305 Pte. Albert John Brewer, 1/1st South Midland Field Ambulance, Royal Army Medical Corps (Territorial Force) (Alvechurch, near Birmingham).

439180 Lance-Cpl. Harry Ernest Pitman, 1/3rd South Midland Field Ambulance, Royal Army Medical Corps (Territorial Force), (Bristol).

2029 Serjt. Frank Robinson, M.M., 23rd Field Ambulance, Royal Army Medical Corps (Strood, Kent).

DECORATIONS CONFERRED BY HIS MAJESTY THE KING OF THE BELGIANS.

Ordre de la Couronne.

Officier.

Capt. Eric Leigh Fyffe, M.B., Royal Army Medical Corps.

Ordre de Leopold II.

Chevalier.

70609 Pte. Ernest Bell, Royal Army Medical Corps (Gateshead).
79983 Pte. William Birnie, Royal Army Medical Corps (Rathen).
82002 Pte. William John Green, Royal Army Medical Corps (Bedford).
1385 Cpl. Charles James Joseph, South African Medical Corps.
1123 Serjt. Edward Frederick Martin, Kaschula, South African Medical Corps.
988 Serjt. Edmund Bloomfield Kekewich, South African Medical Corps.
33153 Serjt. Richard E. Lake, Royal Army Medical Corps (Nelson).
92309 Pte. (Acting Cpl.) Archibald McArthur, Royal Army Medical Corps (Partick, Glasgow).
1398 Serjt. Donald MacFarquhar, South African Medical Corps.
53946 Pte. Joseph A. Hooney, Royal Army Medical Corps (Cork).
2245 Pte. Frederick George Odendal, South African Medical Corps.
18432 Qmr.-Serjt. (Temp. Serjt.-Major) George Frederick Pearce, Royal Army Medical Corps ("E" Leeds).
49058 Pte. Hamilton Relly Taffs, Royal Army Medical Corps (Wandsworth Common, S.W.).
295 Staff-Serjt. Charles Richard Tee, South African Medical Corps.

War Office,
December 4, 1918.

The Secretary of Statefor War has received the following Dispatch from General the Earl of Cavan, K.P., K.C.B., M.V.O., Commanding-in-Chief British Forces in Italy.

General Headquarters,
British Forces in Italy,
November 15, 1918.

38. The fresh influenza epidemic, which broke out shortly before the commencement of the operations, threw a heavy and additional strain on the medical service. Despite this the evacuation and care of both sick and wounded was rapidly and satisfactorily carried out. All the arrangements were most ably organized by my Director of Medical Service, Major-General F. R. Newland, C.B., C.M.G.

ARMY MEDICAL SERVICE.

Col. James Meek, C.B., M.D., is placed on retired pay, dated November 20, 1918.

Col. Henry Mackenzie Adamson, C.B., M.B., is placed on retired pay, dated November 26, 1918.

ROYAL ARMY MEDICAL CORPS.

Capt. Wilfred W. Treves, M.B., F.R.C.S., to be acting Major, dated January 4, 1918.

Major William Davis to be acting Lieutenant-Colonel whilst in command of a Medical Unit, dated August 31, 1918.

Capt. (Acting Major) Alan G. Wells, D.S.O., to draw the pay and allowances of his acting rank whilst specially employed, dated September 10, 1918.

Lieut.-Col. Harold P. W. Barrow, C.M.G., D.S.O., relinquishes the temporary rank of Colonel on reposting, dated September 18, 1918.

Major Rochford N. Hunt, D.S.O., M.B., relinquishes the temporary rank of Lieutenant-Colonel on reposting, dated October 14, 1918.

Capt. Alexander D. Fraser, D.S.O., M.C., M.B., relinquishes the acting rank of Lieutenant Colonel and reverts to the acting rank of Major (with pay and allowances of his substantive rank), dated October 15, 1918.

The undermentioned to be Captains, but not to reckon for pay or allowances prior to December 1, 1918, with precedence as stated :—

Captains, from Special Reserves :—

Dated February 5, 1918.—Francis Dighton Annesley, M.C., next below E. Davies.

Dated February 6, 1918.—William Tyrrell, D.S.O., M.C., M.B., next below R. E. Barnsley.

Dated February 8, 1918.—Joseph Hugh Ward, D.S.O., M.C., M.B., next below St. J. D. Buxton.

Dated February 14, 1918.—Robert Chalmers Aitchison, M.B., next below G. D. Robertson.

Dated March 15, 1918.—William Bird, M.B., next below H. H. Mulholland.

Dated March 19, 1918.—William Ernest Tyndall, M.C., M.B., next below J. A. W. Ebden.

Dated March 30, 1918.—James Vallance, M.B., next below A. N. Minns ; Robert Godfrey Martyn, M.B., next below C. de W. Gibb.

Captains, from Territorial Force :—

Dated April 12, 1918.—James Wilson Burton, M.B., next below C. K. G. Dick.

Dated June 1, 1918.—Manfred Morris, M.B., next below D. N. Macleod.

Dated June 15, 1918.—Basil Hugh Campbell Lea-Wilson, next below W. E. Adam.

Temporary Captains :—

Dated July 10, 1918.—Frederick Harris, M.C., M.B., next below R. P. Cormack.

Dated November 7, 1918.—Gerald Sholto Douglas, next below A. J. Hickey.

The undermentioned to be Lieutenants, and to be granted the temporary rank of Captain, but not to reckon for pay or allowances prior to December 1, 1918 :—

Dated July 21, 1915.—Capt. James Wilfred George Hewat Riddel, M.C., from Territorial Force, with precedence next below F. R. S. Shaw.

Dated February 29, 1916.—Temp. Capt. Philip Hewer Wells, M.C., with precedence next below W. L. A. Harrison.

Dated July 1, 1916.—Capt. Charles Owen James Young, M.C., M.B., from Special Reserve, with precedence next below G. T. Garraway.

The undermentioned relinquish the acting rank of Major on reposting :—

Dated September 29, 1918.—Capt. Charles J. O'Reilly, M.C., M.D.

The undermentioned to be acting Majors :—

Dated September 28, 1918.—Capt. William F. Christie, M.B.

Dated October 1, 1918.—Capt. James Y. Moore.

OBITUARY.

LIEUT.-COL. J. T. McENTIRE, R.A.M.C.

THE Corps has lost a good officer in the late Major (Acting Lieut.-Col.) James T. McEntire, who succumbed to heart failure following influenza and pneumonia, at Salonika, on October 29, 1918.

He was the eldest son of the late Alexander Knox McEntire, J.P., B.L., Official Assignee in Ireland, of Merrion Square, Dublin, and of Mrs. McEntire, Pembroke Park, Dublin, and was educated at St. Andrew's College, in the same city. At Trinity College the deceased officer obtained the degrees of B.A. and M.B. in 1902, and the D.P.H. in 1911. In the year following his graduation he joined the Royal Army Medical Corps, and served in South Africa for five years, and on the West Coast for two years. He went to France from Ireland in 1914 with the original British Expeditionary Force, receiving the "Mons" Star; and in recognition of his good work in the early fighting, in which he was often in positions of great danger, the French Government conferred the Legion of Honour upon him after the battle at Le Cateau. He was also mentioned in dispatches on three occasions.

In June, 1917, after a short rest at home, he was sent to Salonika in charge of the Surgical Division of a General Hospital, and early this year he was given the command of a Stationary Hospital, with the acting rank of Lieutenant-Colonel.

He married Mary, daughter of James Little, Esq., of Sark Tower, Dumfriesshire, and has left one young daughter.

Lieut.-Col. McEntire's kind and cheerful disposition made him very popular with all ranks, and he served with marked enthusiasm and keenness throughout the war. The Corps has lost a very gallant officer, and the sympathy of his many friends goes out to his widow and child in their grievous loss.

BIRTHS.

MITCHELL.—On November 16, at Leintwardine, Herefordshire, the wife of Major Wright Mitchell, Royal Army Medical Corps, of a daughter.

GOODWIN.—On December 1, 1918, at 7, Mount Park Crescent, Ealing, the wife of Lieut.-Col. W. R. P. Goodwin, D.S.O., Royal Army Medical Corps, a son.

DEATH.

HODGSON.—On November 5, at Salonika, of pneumonia following influenza, Lieut.-Col. John Edward Hodgson, Royal Army Medical Corps, dearly loved husband of Winifred Hodgson, 4, South Mount Terrace, York, aged 44.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, Serle Street, London, W.C., not later than the 22nd of the month.

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Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

All such Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notified at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written; but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed: The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," 324, Adastral House, Victoria Embankment, E.C. 4.

The following publications have been received:—

British: Guy's Hospital Gazette, St. Bartholomew's Hospital Journal, The Medical Journal of Australia, Edinburgh Medical Journal, Guy's Hospital Report, St. Thomas's Hospital Report, The Journal of Tropical Medicine and Hygiene, The Hospital, The Medical Press, Tropical Diseases Bulletin, The Medical Journal of South Africa, The Medical Review, Reveille, The Royal Engineers' Journal, Journal of the Royal United Service Institution, Journal of the Department of Public Health, Hospital and Charitable Aid, Public Health, St. Bartholomew's Hospital Report, The Indian Medical Gazette, Bulletin of the Canadian Army Medical Corps, The British Journal of Surgery, The Practitioner, The Army Service Corps Journal.

Foreign: Archives Médicales Belges, United States Public Health Service, Bulletin de la Société de Pathologie Exotique, Bulletin de l'Institut Pasteur, Surgery, Gynæcology and Obstetrics, Abstracts of Bacteriology, The Journal of Infectious Diseases, Office International d'Hygiène Publique.

MANAGER'S NOTICES.

The JOURNAL OF THE ROYAL ARMY MEDICAL CORPS is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," 25, Adastral House, Victoria Embankment, E.C. 4, and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, etc., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally.

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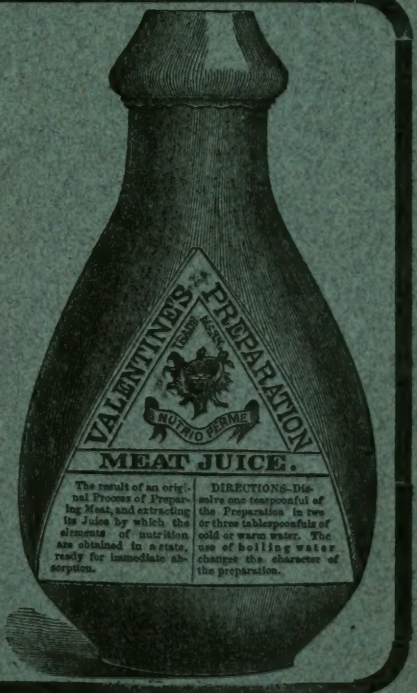
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